

Välkky

KIRJASTOAUTO

A service & interaction design concept



DIPTI SONAWANE

Master of Arts Thesis 2013 • Media Lab, School of Art, Design and Architecture, Aalto University

Välkky

KIRJASTOAUTO

A service & interaction design concept

DIPTI SONAWANE

Master of Arts Thesis 2013

Media Lab, School of Art, Design and Architecture, Aalto University

Author	Dipti Sonawane		
Title of thesis	Välkky Kirjastoauto – A service & interaction design concept		
Department	Media Lab, Department of Media		
Degree programme	Masters in New Media		
Year	2013	Number of pages	140
		Language	English

Abstract

This thesis is about designing a new Mobile Library Bus for the children and city of Espoo, Finland. The project was a collaborative effort between the Espoo City Library and the Departments of Media and Spatial Design, Aalto University. Although a Library Bus has been serving the city for some time, the idea behind the new bus is to bring into use new digital learning tools combined with the already extant regular activities.

Increasing use of technology and direct access to information on the internet has decreased the use of physical libraries everywhere. However, books along with libraries play an integral part in Finnish society. As we head towards adoption of increasing amounts of technology, it has become increasingly important that a change be made in the way library and library buses are perceived today.

The project aims to make design decisions and innovations at various levels such as: media interactions, modularity of the bus-interior, system design, and the building of the bus. Through this project I also wanted to explore the perception of media by children, 3-12 years of age; and to understand whether cultural context influences the use of media among children.

Bringing all my prior experience into use, I expanded the scope of media usage in the Library Bus by conceptualising interactive solutions and activities that would channelize the creative imagination of every child. The bus was conceptualised as a modular space that went beyond books by integrating media tools and periodic playful activities, aimed at engaging the imagination of children and encouraging them to utilise to the maximum facilities within the bus.

As part of the process behind this thesis, multiple workshops and interview sessions were conducted with both children and parents. Brainstorming and ideation sessions led to a range of possible user-experience and service directions for the bus. Extensive research was carried out into media tools which culminated in detailed media tool recommendations.

Ultimately, five different themes were conceptualized, designed, detailed and visualized as final outcomes of the project. Each theme explains in detail the media content, proposed interaction with the media tools, thematic activities within the bus and the modularity of the furniture. The themes developed and conceptualized will be scheduled by the City Library, Espoo once the bus is regularised. The bus, Välkky, was inaugurated publicly on 1 February 2013.

Keywords	interaction design, service design, bookmobile, library bus, media technology
-----------------	---

Acknowledgements

I would like to thank Teemu Lienonen for giving me the opportunity to work in the Learning Environments research group, and for his constant support and patience. I would also like to thank the Espoo City Library team, especially Eeva Laitinen for her generous support and clarity of vision. Finally, I would also like to thank the Spatial Design team, Toni Kauppila, Natalia Baczynska Kimberley, Nina Kosonen and Matti Mikkilä for collaborating with me on this project.

I thank Pipsa Asiala, for her encouragement through the thesis process; and Ilpo Kari and Pekka Salonen for their technical help. I would also like to convey my gratitude to Eila Hietanen who helped me print this document.

A big thank you to my dear friends Palash Mukhopadhyay, who helped me edit my text, and Irene Poutanen for her insightful feedback. I take this opportunity to also express my gratitude to my friends and colleagues: Iris Tomaszewski, Björn Lindholm and Lauri Hassi who volunteered their time and effort to participate in my workshop activities and help me translate the conversations and observations into English.

I also thank all the teachers, librarians, parents and children who willingly participated in my workshops and otherwise gave me their valuable time and insights towards realising this project. I thank all my dear friends here in Helsinki who, though not a part of this project, have been a source of support and strength all through.

Finally, I thank my family, especially my parents for all their love, support and patience; without which this wouldn't have been possible.

Contents

1	Introduction	11
	1.1 AIM OF THE THESIS	12
	1.2 LIBRARY AND MEDIA LITERACY	12
	1.3 LIBRARY BUS AS AN EXPERIENCE	13
	1.4 MOTIVATION	14
2	Design Methods	15
	2.1 CONTEXTUAL INQUIRY	15
	2.1.1 FIELD RESEARCH	
	2.1.2 INTERVIEWS	
	2.2 PARTICIPATORY DESIGN METHODS	18
	2.2.1 DESIGN ARTEFACTS	
	2.3 IDEATION AND DESIGN CONCEPTS	20
3	Context	23
	3.1 HISTORY OF FINNISH LIBRARIES	23
	3.2 HISTORY OF LIBRARY BUS IN FINLAND	25
	3.3 EXAMPLES AROUND THE WORLD	26
	3.3.1 KONE OY (MOBILE LIBRARY BUS IN CHINA)	
	3.3.2 LIBRARY BUS BY MUUNGANO	
	3.3.3 CHILDREN'S LIBRARY IN AARHUS	
	3.3.4 OTHERS	
4	Contextual Inquiry	31
	4.1 ESPOO CITY LIBRARY	32
	4.2 SELLO LIBRARY	32
	4.3 KALLIO LIBRARY	33
	4.4 LIBRARY 10	34
	4.5 TROLL BOY – THE ESPOO LIBRARY BUS	35

4.5.1	PISA PÄIVÄKOTI	
4.5.2	OHRAKASKI PÄIVÄKOTI	
4.5.3	LATOKASKI KOULU	
4.5.4	FRIISILÄ KOULU	
4.5.5	CONSOLIDATED OBSERVATIONS	
4.6	VISITING VIRONNIEMI PÄIVÄKOTI	40
4.6.1	OBSERVATIONS	
4.7	INTERVIEWS & CONVERSATIONS	42
4.7.1	PARENTS	
4.7.2	TEACHERS	
4.7.3	LIBRARIANS	
5	Challenges & Opportunities	49
5.1	MEDIA	49
5.1.1	MEDIA TOOL SELECTION	
5.1.2	MEDIA CONTENT	
5.1.3	COGNITION OVERLOAD	
5.2	TIME	50
5.2.1	PER STUDENT	
5.2.2	BUS SCHEDULE	
5.3	SPACE	52
5.3.1	LIMITATIONS	
5.3.2	FIXTURES	
5.4	CLIMATE	52
6	Participatory Design Workshops	55
6.1	JÄRVITORPPA PÄIVÄKOTI	56
6.2	MARTINKALLIO KOULU GRADE 1	62
6.3	MARTINKALLION KOULU GRADE 6	67
6.4	TIPS TO DESIGN MEDIA/OTHER ACTIVITIES	74
7	Ideation	75
7.1	BRAINSTORMED THEMES	78
7.1.1	ANCIENT EGYPT	
7.1.2	THINGS THAT MOVE	
7.1.3	LIVE MUSIC – EVENT	
7.1.4	CLASSROOM BUS – SPACE LENDER	
7.1.5	SPORTS AND GAMES	
7.2	ACTIVITIES & SPACES	84
7.3	SCALE PROTOTYPE	86

.....

8	Final Concept	89
	8.1 MODULAR LIBRARY BUS & THE NEW SYSTEM	89
	8.2 MEDIA RECOMMENDATIONS	93
	8.3 SELECTED THEMES	96
	8.3.1 THE REGULAR BUS	
	8.3.2 STARRY SKIES	
	8.3.3 MINI CINEMA	
	8.3.4 STORYTELLING	
	8.3.5 GARDENING	
9	Välkky	113
B	Bibliography	121
A	Appendix	127
	A.1 WORKSHOP PLANS	127
	A.1.1 JÄRVITORPPA PÄIVÄKOTI	
	A.1.2 MARTINKALLIO KOULU – GRADE 1	
	A.1.3 MARTINKALLIO KOULU – GRADE 6	
	A.2 MAKING OF THE NEW BUS	132
	A.3 MEDIA LIST AND NUMBERS	134
	A.4 MULTI-TOUCH TABLE RECOMMENDATIONS	136
	A.5 OTHER GENERAL RECOMMENDATIONS	139

.....

1

Introduction

My thesis work is about designing a new Mobile Library Bus for children in Espoo, Finland — a collaborative effort between the Espoo City Library and Aalto University. The idea of the new bus is to introduce new digital learning tools in combination with the regular activities inside the bus. This bus is the first of its kind in Finland, where new media tools and books merge to form an interactive learning environment. It seeks to be an inspiration for the other library bus services in and around Finland.

A bookmobile or mobile library is a large vehicle designed for use as a library. It is designed to hold books on shelves in such a way that when the vehicle is parked they can be accessed by readers. Mobile libraries are often used to provide library services to villages and city suburbs that have no library buildings. They can also service groups of those who have difficulty accessing libraries, e.g., occupants of retirement homes. They may also carry other information or computer equipment. Some libraries also use their bookmobiles to deliver materials, such as audio books, large print novels, and eBooks, to homebound people without anyone to go to the library for them.

The mobile library bus in Espoo currently offers a very simple and elegant service of lending books and media-materials to the school children and the general public. However, as we head towards an era of immersive technology, it has become increasingly evident that a change be made in positioning of the library bus today. Libraries across the world today have already moved to deploy new technology in the service of their users, and thus the need was felt to reiterate this library bus to provide for the changing needs of the children and the peri-urban population it caters to.

The concept of the new bus focuses not only on introducing new media tools for information and learning but also brings in novel experiences framed around pertinent themes. Five different themes were designed, conceptualized and

visualized for the use of the library bus in its day-to-day operations, as well as special departures from regular service such as workshops and guest events. Each theme outlines the media tools, interaction with the media tools, ideas for the space and modular furniture. The thematic content will be developed, conceptualized and scheduled by the library officials once the new bus is operational. The central idea is to integrate media tools in a manner that combines media-interaction through specially designed applications and traditional books within the space of the library bus.

Working with the library officials also gave me a chance to conceptualize a new system (the logistics of the bus). The bus already follows a specific schedule and because the media tools had to be inside the bus, the service schedule needed considerable redesigning.

The bus serves schools and kindergartens in the city of Espoo, and primarily children between 3-12 years of age. The new bus was launched on 1 Feb 2013 at the Sello Library in Espoo.

1.1 AIM OF THE THESIS

My aim of the project was to suggest appropriate interactive media tools and design interactions around them. The project aims to make design decisions and innovations at various levels such as media interactions, media content, modularity of the interior space, system design, and the building of the bus. Expanding the scope of media usage by providing interactive solutions that could channelize the creative imagination of every child, I aim to position the library bus as a space to strike a balance between hands-on activities and technology.

1.2 LIBRARY AND MEDIA LITERACY

Along with the design deliverables, my thesis also highlights some important issues which libraries around the world are faced with today. Increasing use of technology and direct access to information on the internet has lowered the use of the physical libraries everywhere. Books play a very emotional and integral part in Finnish society and so do libraries. Libraries in Finland have also become increasingly active in the arena of media education while the library services have expanded. Alongside conventional books there are cartoons, audiovisual recordings, computer games and of course, internet access. The library institution has traditionally co-operated closely with schools and thus media education in many localities has been achieved as a joint effort between school and library.¹

Libraries across Finland share their resources and services to support education and lifelong learning, particularly in productive training for citizenship, to help people make intelligent decisions and lead to more enlightened lives. The concept of public education for every citizen leads inexorably to the democratization of education and direct responses to community needs. So most libraries are taking a role to reach all those who are not normal library patrons, who cannot access the local libraries on a regular basis, to build socially oriented information systems, and to provide challenging materials. Mobile libraries become a means of this role.² Such a need also occurs in educating people about media literacy. In Finland media literacy has always played a very important role. The Finnish society of media education aims to support and develop the field of research and practices concerning media education since 2005. One of primary roles is in association with libraries. The aim of media education work in libraries is to support the information management and media and information literacy of children and young people. Libraries are aware of current trends in the changing media environment and the world of digital games and gaming.³ Media literacy programmes in Finland offer a range of training projects to children, young people, parents, teachers and librarians. They also focus on providing media literacy programmes in early childhood.

It is important to translate these services into the mobile libraries as well in order to expand the facilities to schools and people staying far from the physical libraries. Espoo has identified this need and is trying to make the bus a rich and rewarding learning experience. This new bus promises to bring an experience of joy for every child, youth and adult.

1.3 LIBRARY BUS AS AN EXPERIENCE

Library bus has always been a joyous experience for every child in school. Children get into the bus and search for something that they love and are encouraged to love i.e. 'books'.

"I take my kids to the Library bus which comes to our locality. Sometimes I have to shut my windows when the bus arrives, because my kids will surely insist on me taking them to the bus. For them it's something unique that's coming specially for them. Something that is fun to be inside!" says a parent. On the other hand, the bus is very nostalgic for grown-ups, "We used to use a library bus only when we were kids. It was so much fun!" reminisces a student.

Our bus aims to sustain these emotions become a symbol of joy and fun learning space for everyone. The bus also encourage parents and grown-ups to start using

2. "Reaching out through a mobile library - 66th IFLA Council and General Conference - Conference Programme and Proceedings," n.d.

3. "Mediakasvatus," n.d.

the service. The library bus has enough potential to attract a lot of people, not only children but also adults. Reaching out to people with media tools along with interactive learning experiences directly invites curiosity among the youth and adults alike. Implementing media tools is something that the physical libraries are already making an effort towards, so the unique idea in this bus was to bring in different experiences through the introduction of digital tools featuring thematic media content.

The bus should be as inviting as an ice-cream van that arrives at the neighbourhood enticing families with the experience of eating ice-cream together. Similarly, the bus would aim at delivering an experience of learning through new media tools for families, children, experts and librarians.

1.4 MOTIVATION

I was involved in Project Vision in Bangalore, India for three years which focussed my attention towards creating media tools for learning and educating purposes. The project aimed at creating new learning experiences through media for children and teachers. Working together with children from urban slums and their communities to develop learning experiences helped me develop a very unique perspective towards building learning experiences for education purposes. The project made me question design thinking and design process at every level. My forte was ethnographic research and problem solving through design.

The Library Bus project drew obvious parallels my work with Project Vision, and I wanted to explore the Finnish education system and try to work with the Finnish children – in some way, to stretch my design methodologies to a global extent. I wanted to experiment with media and children to develop strategies that justified the need for basic skills and media understanding for the 21st century. My interest and intuitiveness for engaging with children, introducing media to them, learning from their behaviours and patterns — all leading up to designing better interactions in the bus — was something that I directly related to my prior work.

Through this project I wanted to explore and study how children understand media, and whether cultural context influences the use of media among children. Building upon my prior work in the area of media and education, I wanted to understand why media is always perceived as games or writing documents for homework. Through this project, I also wanted to break the notion of technology posing a threat to early childhood. I wanted to bring about a change in the way we perceive media technology for learning and knowledge-dissemination for children. Media tools can be fun and engaging without simply being entertaining.

2

Design Methods

Research-based design emphasizes serving users and the iterative process consists of four partly overlapping phases: contextual inquiry, participatory design, product design, and production of software as hypotheses.¹

These are a few design methods I employed to first understand my target users and their perception of media technology; second, to get an idea of the context my project was situated in and finally, to develop the ideas and concepts that would make up the new service. My process consisted of three phases: contextual inquiry, participatory design workshops and, ideation and design concepts.

Although the library bus service might in the long run cater to a wider range of users, including adults; for the time being it would cater primarily to children. Therefore, employing the principle of action research wherein the targets of the research also participate in the research process², I began my design process by engaging in contextual inquiry centered around the primary users — children.

2.1 CONTEXTUAL INQUIRY

Contextual Inquiry, provides a framework for understanding different data-gathering approaches and addresses the following methods for getting at users' implicit understandings: work based interviews, post-observation inquiries, artifact walkthroughs, participatory prototyping, and future scenarios. Contextual Inquiry provides designers with specific user words and user scenarios from which to draw as they make their design decisions.³

The first problem for designers is to understand the customers: their needs, their desires, their approach to the work. Often the work has become so habitual to the people who do it that they often have difficulty articulating exactly what they do and why they do it. Contextual inquiry:

1. *Leinonen et al., 2008*

2. *Leinonen et al., 2008*

3. *Duncan and Beabes, 1995*

- Reveals the details and motivations implicit in people's work
- Makes the customer and their work needs real to the designers
- Introduces customer data as the basis for making decisions
- Creates a shared understanding of the data throughout the team.⁴

In my first phase of research, I tried to understand the context of the project, and looked into subjects revolving around library services and media technology for children. Children are increasingly using mobile and social technologies to share information, connect with others, and learn inside and outside of the classroom. It is the iChild generation: a new generation of children growing to be digitally interactive and intensively social.⁵ It was very important to develop an overall understanding of the field and benchmark some of my findings from my research. Along with these, I also touched upon topics that I found relevant to building the new library bus system. The salient areas that I chose to investigate included mobile libraries, libraries, children, parents & understanding modern media interactions.

Contextual Inquiry is a synthesis of ethnographic, field research, and participatory design methods that provide designers with grounded and detailed knowledge of user work as a basis for their design.⁶

2.1.1 FIELD RESEARCH

Within qualitative research, there are many different methods that can be employed. Three of them, ethnographies (or field research), interviews, case studies and, may be particularly appropriate for studying children participating in a technology design process.⁷

As part of my field research, I visited 4 libraries in Helsinki and Espoo to study the extant facilities in these libraries. I also took a ride in the library bus Peikonpoika (Troll Boy). I chose these libraries specifically because each one of them has its own set of unique features. The library bus ride was extremely important as it was a new experience for me, and also it was the focal point of the project itself. It was thus important to understand the service thoroughly before designing the new one. It was important to also understand the cultural aspects and connotations of the library for the Finnish people. Details of this qualitative research are mentioned the chapter Contextual Inquiry.

- **Espoo City Library** — This library is newly built and the proposed new library bus service will be a part of this library.
- **Sello Library** — This library was chosen as it has a unique young people's area and children's facilities.

4. Beyer and Holtzblatt, 1999

5. Giaccardi et al., 2012

6. Duncan and Beabes, 1995

7. Guha et al., 2010

- **Kallio Library** — The children’s section in this library is particularly interesting and offers a range of facilities. It also has an attractive children’s self-issuing machine.
- **Library 10** — Library 10 is a modern library in Helsinki, and offers non-traditional services. Instead of books, this library provides the city’s populace with practical advice and guidance in electronic communication and living in an information society.
- **Peikonpoika Library Bus** — This bus ride was a crucial to experiencing the current library bus service. I learnt first-hand, the day to day services offered by the bus and had the opportunity to study the children’s behaviour in the bus.

2.1.2 INTERVIEWS

Interviewing provides access to the context of people’s behavior and thereby provides a way for researchers to understand the meaning of that behavior. Interviewing allows us to put behavior in context and provides access to understanding their action.⁸

Though predominant forms of interviewing is one-to-one, interviews can be organised around a set of structured questions, or be unstructured with no prior questions. I conducted conversational interviews with 3 teachers and 4 librarians. The interviews let me understand the teachers’ point of view on children’s media usage and also their reactions to the proposed change in service change for the library bus. With the librarians, I took a very short and quick, but fruitful and focussed interview. The interview revealed their views upon the existing as well as the proposed new service. Being closely associated with the library services, they were honest in their opinions related to the change. These interviews are discussed in greater detail in the chapter Contextual Inquiry.

I also invited a focus group of 4 parents to discuss the proposed changes in the library bus and to understand their views on the introduction of media tools into the bus. The discussions in the focus group were guided according to a questionnaire I had drawn up prior to meeting, and the responses of the parents proved very insightful — non surprising considering their children would be the primary users of the proposed service. The session was aimed not only towards favourable responses but also their critical point of view towards media tools in the bus, and media tools in general. This session lay the foundation for my later attempts to introduce parent-child participation within the new service.

The third component of contextual inquiry, the case studies involved studying libraries from around the world that are mobile or choose to engage with children. These are described in the chapter Context.

8. Seidman, 1998

2.2 PARTICIPATORY DESIGN METHODS

Through this project I also collaborated with experts from varied domains including spatial designers, design professionals, educators, librarians and manufacturers. The spatial design team contributed extensively to the modular layout of the bus, and along with professionals from Kiitokori, helped bring it to life. Together, we worked with children, parents and media professionals to build a qualitative understanding of the role of libraries in their lives thus making them active participants in the design process. As they were my primary target users, I was really curious to get to know the Finnish children and understand their needs and views. I was clear as to what I wanted from the children through these workshops. I planned workshops with children from different age-groups, in order to obtain a panoramic view. The workshops were planned around role-playing, storytelling and drawing. At the end of each workshop, the children were asked to sketch out their creative ideas. There were no direct questions to the children as I wanted to evoke intuitive answers from them.

Actual experimentation, the manipulation and testing of ideas in reality, provides children with direct, concrete feedback about the accuracy of their ideas as they work them out. Play and experimentation are powerful forces in the development of the individual mind, but constructivism has led to the additional discovery that powerful gains are made when children work together, as well. When children collaborate, they share the process of constructing their ideas, instead of simply laboring individually. The advantages of this collective effort are that children are able to reflect on and elaborate not just their own ideas, but those of their peers as well. Children come to view their peers not as competitors but as resources. Mutual tutoring, a sense of shared progress and shared goals, and a feeling of teamwork are the natural outcomes of cooperative problem-solving, and these processes have been shown to produce substantial advances in learning. The focus of constructivism, then, is the child as a self- governed creator of knowledge.⁹

2.2.1 DESIGN ARTEFACTS

In order to get children the children excited and engaged as also participate freely in the workshop activities, I made some artifacts/props. These were then worn by the teach during the workshop. Material design artefacts are employed in a wide range of collaborative design events, for instance mock-ups probes, props and card-based design games. In these examples, the material design artefacts are used to help facilitate cooperation between users and designers, or to frame the design event in a specific way, to provoke insights.¹⁰

I embedded an iPad as representational media tool into oversized cardboard book. The prop forced the children to imagine the integration of digital and analog media together through the abstraction of the book plus iPad entity.

Role-playing is valued by designers because it allows them to see their products from another person's perspective (often a potential user of their product). Designers often combine these performance techniques with design methodologies, such as brainstorming and user testing. Role-playing and improvisation are used to supplement many design methodologies. Designers use these performance techniques to achieve the following effects:

- Become less self-conscious.
- Better group communication.
- Create new ideas.
- Greater group focus.
- Inform of user's needs.¹¹

I organised a series of co-design workshops with children focused mainly on play. Through active participation and role-play I wanted to observe children's interactions with the prop and their ideas of playing with the personified Petri the book (design prop).

Narrative methods are used to uncover children views and encourage them to verbalize their thoughts as a way to envision and articulate future possibilities in different contexts (either real or fictional). Techniques range from verbal and visual storytelling, to role-play, to children engaging with fictional characters within a shared imaginary space.¹²

This was a crucial step in my workshop design as it really tested their perception and acceptance of digital technology merged with analogue books. Workshops are detailed in the chapter Participatory Design Workshops.

11. Medler and Magerko, 2010

12. Giaccardi et al., 2012

2.3 IDEATION AND DESIGN CONCEPTS

After going through the findings from the contextual inquiries and participatory design workshops, I began to develop concepts for the new bus. I used all my resources to bring together the best possible solution to develop an exciting library bus service.

Creative solutions to problems typically result from the combination of frames from disparate areas of the knowledge network within the context of the problem at hand. Combinations resulting from more distant frames have the potential to yield solutions of greater creativity than those resulting from more proximally located frames.¹³

Together with the Spatial design team and mentors involved in the project, I brainstormed possible concepts that could be taken further. This phase generated lots of ideas that built upon a central core of a modular and themed bus for children. The difference in mutual points-of-view between me and the spatial design team allowed us to come up with innovative solutions that built on both of our past experiences. This stage allowed us to think freely and contribute as many ideas as we could come up with — some of which were elegant combinations of ideas pitched by either group. Apart from group brainstorming, I also brainstormed individually to generate ideas and concepts for possible media recommendations and media interactions in the bus. The space inside the bus was a challenge in itself. Due to the system being related to the media interactions by time, I needed to constantly be aware of the larger picture. These are clearly discussed in the chapters Challenges and Opportunities, and Ideation.

As I watched the concept of the new bus evolve through the project, I began looking deeper and deeper into the users. Though the user studies should reflect the final design and visa versa, it is important that these findings are not directly translated into solutions to a particular problem. Design solutions are sometimes based on the creativity of a designer, and the ability to distinguish between what the users want and what they really need. In my project the design solutions were a combination of both creative thinking and reflections, that built upon a foundation of user studies and research. All the concepts developed for the new library bus has an understanding of user-centered design at its very core.

After intensive brainstorming, detailed scenarios of the ideas, as photomontage sketches, were presented to the Espoo library. These sketched scenarios helped everyone clearly visualise the concept of the new bus with little ambiguity.

Scenarios present possible ways to use a system to accomplish some desired function. Object-oriented analysis and design use cases highlight the benefits of creating concrete, use-oriented system descriptions prior to modeling function, data, and behavior. Scenarios have also become popular in other fields, notably human-computer interaction and strategic planning.¹⁴

There was much discussion upon these scenarios, especially regarding which ones to develop further. These scenarios were later used as a basis for developing the final ideas that were presented to the Espoo library. All the scenarios during the ideation phase and the final phase are discussed and explained in the chapters Ideation and Final Concept.

While we were still brainstorming and conceptualising, the spatial design team and I built a true scale but low-resolution prototype of the space inside the bus. We put together a rough skeleton to simulate the interior of the bus. We used this prototype as a means for design. In design and development processes, prototypes are used not for proving solutions but for discovering problems or for exploring new solution directions. Even though they can serve other purposes, prototypes in this context are a means of generative and evaluative discovery. When incomplete, a prototype reveals certain aspects of a design idea—that is, it filters certain qualities.¹⁵

This model helped us understand the scale which we were designing for, and provided us a space within which to think about it. Most meetings and discussions took place inside this bus space. The prototype wasn't fully successful but it did allow us to think through the limitations of space. It is described in greater detail in the chapter Ideation.

14. Weidenhaupt et al., 1998

15. Lim et al., 2008

3

Context

In order to gain a basic understanding of the libraries and the library bus in Finland, it was important for me to familiarise myself with its history and evolution. It is said that the world's oldest public library was founded by educationist and philosopher Benjamin Franklin in 1731, still operational under the name of Philadelfian Library Company. This was also the first successful lending library, and until 1850 it was the largest public library in the United States. The first tax-funded library was founded in the United States in 1833.¹

3.1 HISTORY OF FINNISH LIBRARIES

The history of Finnish library can be traced back to the 18th century. Prior to this, however, there is evidence of emphasis upon literacy and knowledge-dissemination under the activities of the Church, both Catholic and continuing after the Lutheran Reformation. Finland's first public lending library opened in 1794 in Vaasa Chapter Society Library, which lent to all city residents, not just shareholders. In the mid 1800s the educated classes and students began to establish libraries for the benefit of the Finnish-speaking common people, contributing to civilized ideals and national revival, and later to the labor movement. In 1921, the State began to aid the libraries.

Metropolitan area libraries have been working together since 1976, and at the time purchased its first common computer-based lending system. The 1980s, customers received a sub-regional common library card. The HelMet-service led to the creation of a common collection, which is in constant use by all the people of the region. As part of the HelMet system, the library-material can be ordered from one office, and the return of the same can be at any library under the system. For example, a book borrowed at Espoo Library can therefore be returned in Helsinki, and vice versa. Today, the HelMet library system has a total of sixty-three offices and six mobile libraries.²

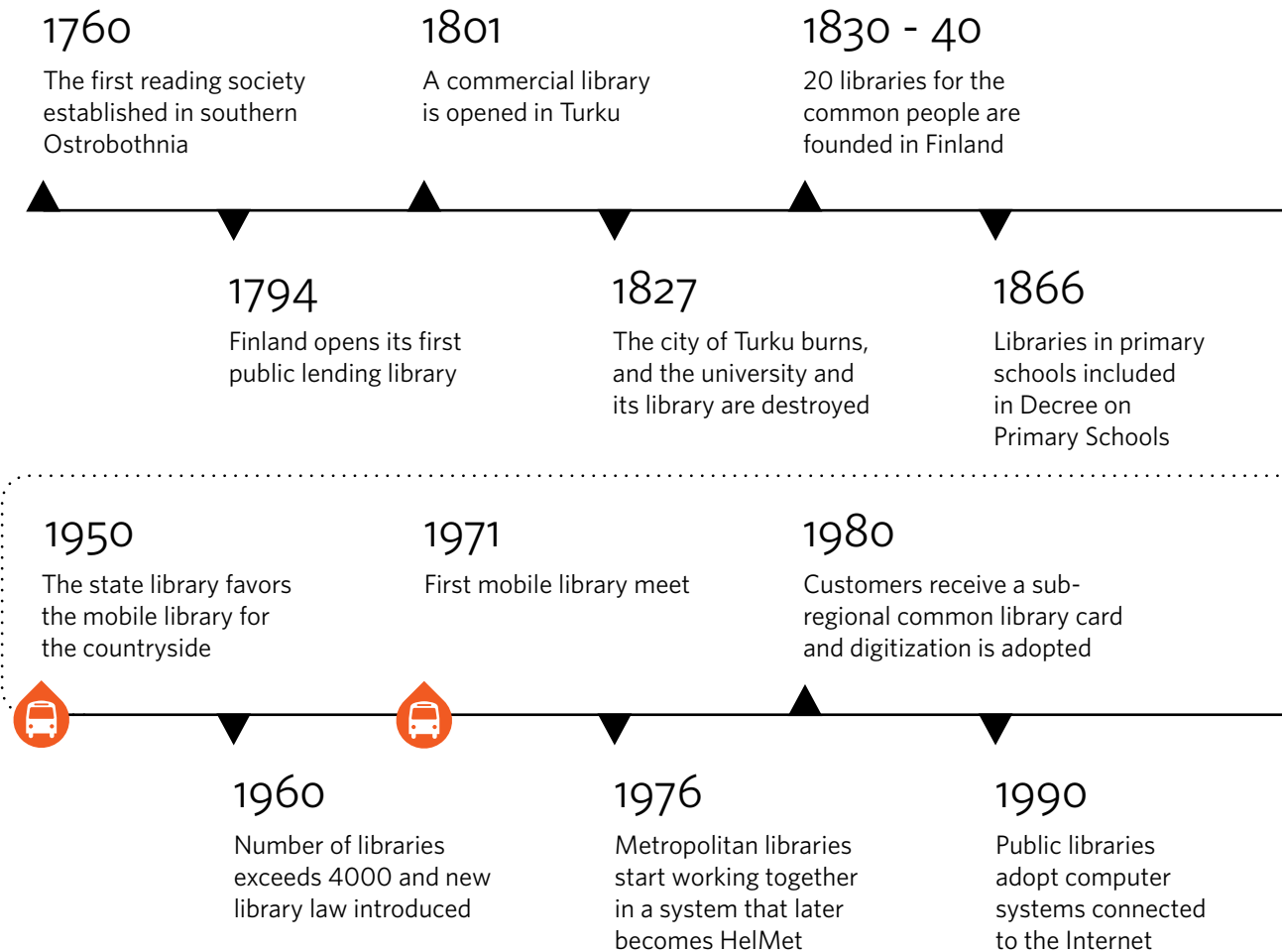
1. "Kirjasto - Wikipedia," n.d.

2. "HelMet-kirjasto - Wikipedia," n.d.

Here are some milestones from the evolution of the Finnish library system.³ This is not a comprehensive timeline, these events have been chosen for their relevance to this thesis.

The history of Finnish libraries clearly indicates that libraries were a crucial part of Finnish life. Digitization was adopted in the 1980s when computers were becoming more mainstream. The number of libraries continues to grow and clearly demonstrates that the municipalities are constant in their effort to better their book-collections and other materials, and implement more modern facilities.

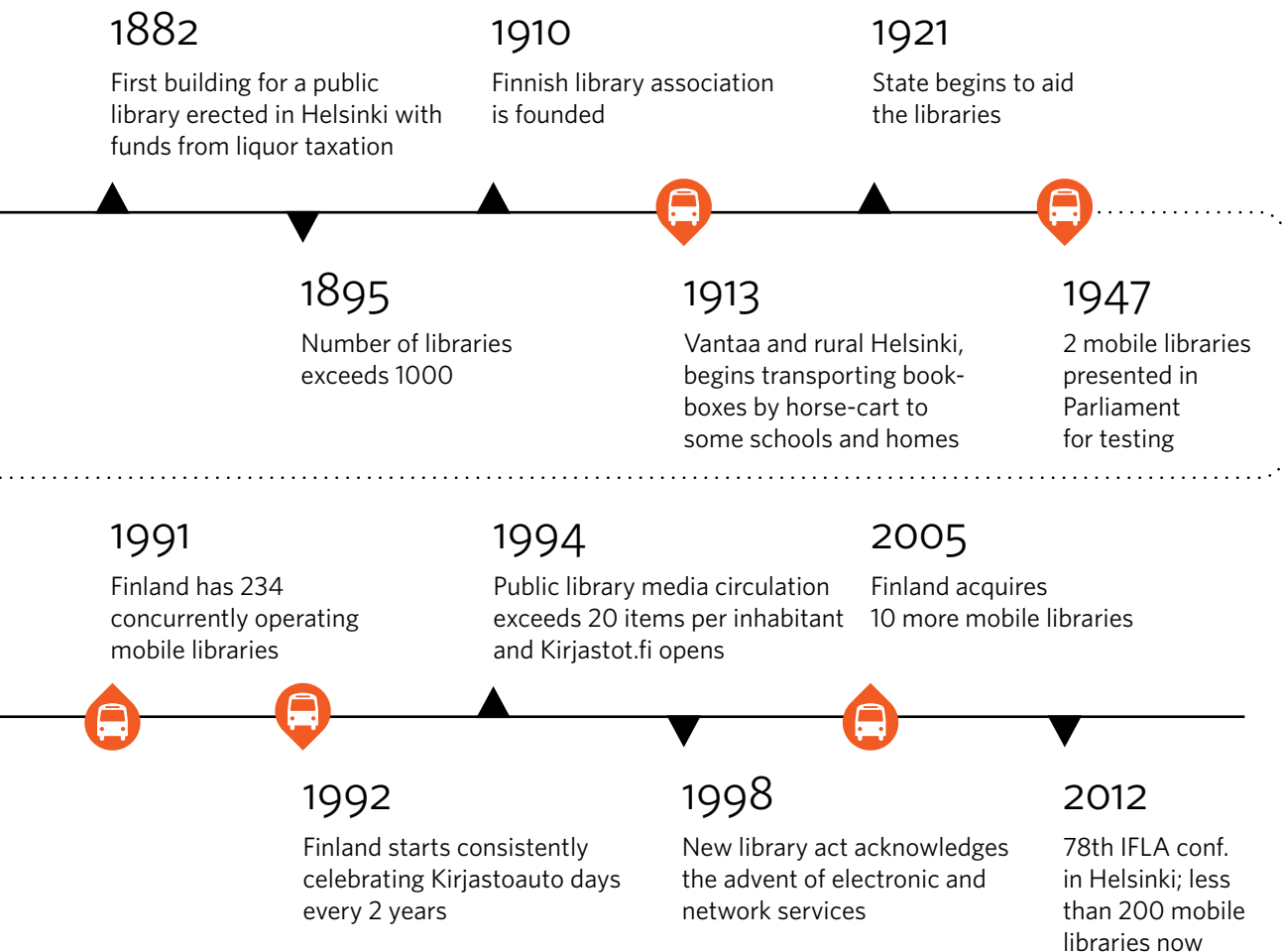
MILESTONES FROM THE HISTORY OF FINNISH LIBRARY



3. "Finnish Libraries Now!," n.d.

3.2 HISTORY OF LIBRARY BUS IN FINLAND

The first information about a mobile library in Finland comes from 1913 from when the locality of Vantaa, and the then rural municipality of Helsinki, began to transport book-boxes to some schools and homes by horse cart. Mobile libraries were used in Finland until the end of the 1930s under the name 'kirjastoauto'. In 1947, a pair of mobile libraries were presented in Parliament for the purpose of testing. These were operational over the next decade in the rural municipality of Helsinki, along with the neighboring towns of Munsala and Nokia.



In the 1950s the state library decided to favor the mobile library for countryside areas where people would be far away from the static libraries. The first prototype mobile libraries were tested in five municipalities, and municipal or privately owned vans were used as vehicles. The positive results from this test showed the hidden love for books among people in the countryside. People appreciated the concept a lot, and more frequent routes were demanded. In the 1960s Finland got a new library law and the first mobile library meet happened in 1971.

Finland had a maximum of 234 concurrently operating mobile libraries in 1991. In 2005, the country acquired ten more mobile libraries. Today, there are less than 200 mobile libraries, with a lifespan of around two decades each. Finland has celebrated Kirjastoauto days consistently since 1992, about every two years at different locations across the country.⁴

3.3 EXAMPLES AROUND THE WORLD

.....

3.3.1 KONE OY (MOBILE LIBRARY BUS IN CHINA)

KONE Corporation Centennial Foundation wanted to award its first grant to a project which provides a fully furnished mobile library and services for migrant children and their schools in China. The Foundation is a not-for-profit organization whose mission is to advance and support developmental, educational and cultural activities for children and youth around the world.



Afterschool activities with the support of volunteers at the mobile library

.....

4. "Kirjastoauto - Wikipedia," n.d.

The project was announced in May 2010, and the brand-new mobile library was launched on 24th September 2011 at the Limin School. The Finnish educational publisher, WSOYpro, together with Sanoma Learning, provided and funded a large number of activity books for the children visiting the mobile library.

The mobile library carries around 3,000 children’s books but is also equipped for tutoring, teacher-support, afterschool reading clubs and other related activities. These afterschool activities are also very welcome for the children whose parents are working long days and whose relatives are living far away in the countryside.⁵

3.3.2 LIBRARY BUS BY MUUNGANO

I benchmarked this project as inspiration. This bus is a similar media library bus designed in Sweden by Peter Thuvander and Martin Hedenström of Swedish design group Muungano. They also have won the Swedish Library Bus of the Year award for the year 2008 from the Swedish Librarian Society.

The library bus was designed for the town of Kiruna, and incorporates a library, small cinema, computer games, a sofa for listening to music and internet access.

The function of the new bus is to supply a larger service, where new digital media is presented as well as traditional printed material. Except from distributing media, the bus will also function as a place for people to communicate on the web and enable meetings between different groups in the society.



A lantern in the dark to light up the surroundings



The bus interiors

.....
5. "Mobile Library brings joy of learning to children in China - News - Sanoma Learning - About us - Sanoma.com," n.d.

Because of the lack of sunlight during most of the year in the north the bus is like a lantern when dark to attract people and light up the surroundings.

This bus proved a major inspiration for the spatial design team, with its colorful and utilitarian interiors. The bus makes no mention about activities other than the ones mentioned above. However, the paint and colorful graphic along with its interior design really caught our attention.⁶

3.3.3 CHILDREN'S LIBRARY IN AARHUS

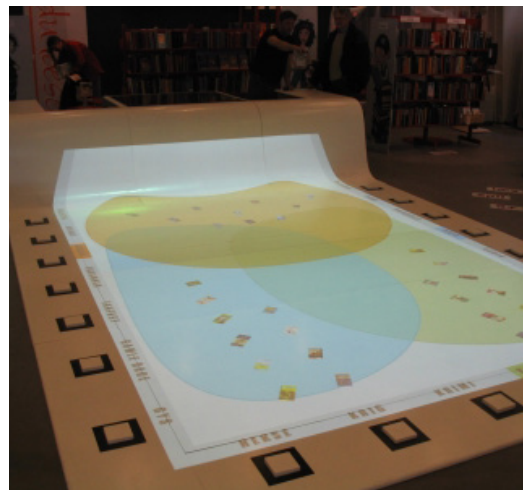
The Children's Interactive Library project was an untraditional interdisciplinary research and innovation project exploring the children's library of the future.

The objective was to create spaces for children in the library that offer new experiences, learning, events, sense impressions and physical activity. And at the same time acknowledging the library's unique capacity of being the place where children come in order to acquire information and knowledge.⁷

There were some really inspirational interaction design ideas in this project that made me approach the library bus as a place of fun and interactivity involving children, teachers, parents and even librarians. These were ideas that could bring together traditional and new media to enhance the experience in the library bus.⁸



The bibphone - record and listen to reviews



The story surfer

6. "Library bus by Muungano - Dezeen," n.d.

7. Lykke-Olesen and Nielsen, 2007

8. Hapel, 2010

3.3.4 OTHERS

Apart from these, I encountered instances of several other unique mobile libraries from across the world. Here are some of the more notable ones.⁹



Book bus, Japan



Donkey library, Zimbabwe



Camel library, Kenya



Bookmobile bus, Chile

9. "'El Biblioburro' (Donkey Library) and Other Mobile Libraries | Sustainable Cities Collective," n.d.

4

Contextual Inquiry

Contextual Inquiry is a synthesis of ethnographic, field research, and participatory design methods that provide designers with grounded and detailed knowledge of user work as a basis for their design.¹ As the first step towards understanding my context, I chose to visit 4 libraries and take a ride in the Espoo city library bus. This study helped me get to know and experience the different facilities that these libraries provide. I also seized this opportunity to interview the librarians. The main reason behind visiting the libraries was to view and experience the children's sections and the proliferation of media tools in them.

The tour in the library bus was an essential part of my contextual enquiry, as it provided me with a first-hand understanding of the service. I travelled during the regular service days of the bus and observed the children's reactions when they entered the bus. These observations afforded me creative insights towards designing creative concepts for the new service.



Children's area in the Espoo City Library

1. Duncan and Beabes, 1995

4.1 ESPOO CITY LIBRARY

The Espoo city library is not very large but has spaces for children and young people to sit, play board-games and generally be themselves. I chose to visit this library because it was newly built and the library bus is hosted by this particular library. I met the library officials and they were excited to show me around the facilities that they had to offer.

Of course, I paid special attention to and investigated the children's section in this library. There is a storytelling room for small children to sit or sprawl on the floor to exchange stories. The library is relatively new, having just opened in Jan 2011 and the interiors are tasteful and warm. There is also a presentation area, provided with a projector and a screen, where visitors to the library can hold small conferences or meetings. A quick tour was given to me by a library member explaining the various spaces in the library.

4.2 SELLO LIBRARY

Together with the spatial design team, I decided to visit Sello library in Leppävaara in Espoo. We benchmarked this particular library because it is the largest library in the area and offers a varied range of services. The goal of the Sello library is to be a service destination for all age groups. Special attention has been given to children's library activities and library services that are oriented towards teenagers.



Children's area in Sello Library



Computer games

This library has a beautiful, large and colorful children's section and a special young people's playing area. The best part of this library was that in the young people's area students were allowed to completely be themselves and even make noise! There were special cabinets for students who wanted to work on computers designed such that noise created outside would not disturb on the inside. There were also a lot of Kinect 360° interactive games for young people to play with. The librarian mentioned that lots of young children, along with their parents, attend events that are organised for them specially in this space.

4.3 KALLIO LIBRARY

I visited this library especially to try out the self-issuing machines in the children's section. The self issuing system is very simple and easy to use. The machine is colorful in the children's section, but bland and strictly functional in the other areas of the library. I inquired of the librarian, "How many children actually use the self-issuing machine?", and she replied, "Not many! Actually, none among the children. They usually come to the counter to issue or return the books".

The children's area in the library is engaging and there are interesting niches for children to sit and read books or listen to music without disturbance. In terms of media, there are computers where children can play games, work etc. and music systems where children can play DVDs and listen to music. I noticed that children really enjoyed putting the DVDs into the player and that act for them was more fun and exciting than listening to the music itself. There is also a hall-like area for children to enjoy events and shows organised by the library. It is in this library that I created my first library membership card, in only about 15 mins.



Children's self-issuing machine



Regular self-issuing machine



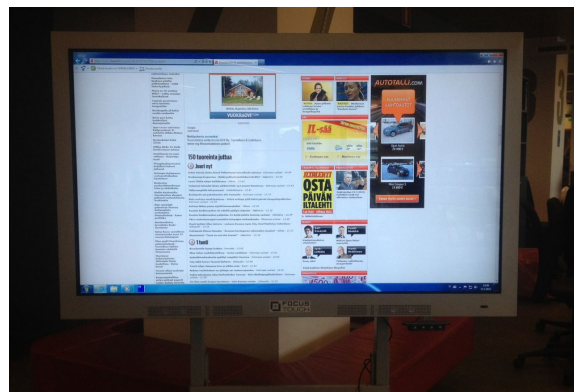
Music listening cubicles

4.4 LIBRARY 10

Library 10 is a modern library in the center of Helsinki. In addition to having a broad collection of musical recordings, the library is equipped with versatile computer workstations. It is smaller than the other libraries mentioned above, but this could possibly be the most technologically advanced of them all. There are provided large screens for people to browse newspapers and other online material, and an open stage area for music performances and shows. The self-issuing system in this library differs in appearance but uses the same technology as the other libraries. In this library there were computers with a similar interface to that of the Kallio library for issuing-out books and DVDs. I issued out a DVD and returned it almost immediately to experience first-hand how the system works. The library was full of people, most of them students, who were working on their own laptops. This library, interestingly, had a fully-equipped DJ station — complete with a dual-turntable vinyl player, for shows and events. Though small in size, this library was very busy.



General self-issuing machine in Library 10



Large screens for news and updates



General self-returning machines

4.5 TROLL BOY – THE ESPOO LIBRARY BUS

There are library buses in the city but it's quite difficult to locate them as the timings are uncertain, and the same is the case with the Espoo library bus as well. I took a ride the bus to observe and experience the service myself. Undeniably, it was very important for me to understand and study the current service to be able to develop a new one.

I boarded the Troll Boy (or Peikonpoika), a 15-year-old bus that carries 2000-3000 books inclusive of DVDs and magazines. The bus travels to schools from 9-12 hrs., and visits two daycare centers and two schools within that time. The bus stops for 20 mins. at daycare centers and for 30-45mins. at schools. The schedule and timetable are synched with the daycare homes, schools and the library through mutual consultation. The bus arrives once a month at the daycare homes and small schools, and twice a month at the big schools. The bus is also open to the general public but goes unnoticed most of the time.



Interior of the Espoo Library Bus



Children browsing books inside the bus



Children playing with an interactive book

4.5.1 PISA PÄIVÄKOTI

No children came to pick up books. Instead, the daycare teacher came with her basket and picked up what was needed and returned. She knew exactly where to find specific books and took 10-15 mins to make her selection. She took about 20 books for the children, and the issuing process was very fast. The librarian always issues out books for everyone in the bus.

4.5.2 OHRAKASKI PÄIVÄKOTI

The kids from this center didn't come into the bus as they were all playing in the snow outdoors. The teacher issued out the books for the children. She also knew where exactly to look for the books, and issued out approximately 15-20 books. She browsed very carefully and probably got everything she was looking for and issued them out from the librarian. In all, she spent around 20 mins in the bus.

4.5.3 LATOKASKI KOULU

This is a primary school, with Grades from 1 to 6. About 30-49 children from Grade 3 (9-10 year olds) entered here, and were very excited to be inside the bus. The bus suddenly was very alive and full of sounds. Sometimes the teachers guided the children to pick up specific books, but rest of the time the kids were left free to choose their own. In both cases, each student had to issue out at least one book.

Every class spent approximately half an hour to making their selection, and formed a queue near the librarian in the bus to issue out the selected books. Each student has a library card which they show to the librarian while issuing out the books. No one used the self-issuing machine.

.....



Crowded bus with children browsing books



A child takes time to quickly read a book



Children browsing books inside the bus

After this they returned to their class, along with their accompanying teacher. The teachers greet and chat with the librarians, and the bus transforms into a social place rather than a mere carrier of books.

Each time a class returns back to school, the next class would enter the bus to make their selection of books. The children would look for new and exciting corners in the bus and, for me, it was interesting to watch everyone navigate through the little space looking for books.

Grade 6 students knew exactly where to look for their kind of books, and they did not bother to look at anything in the children's section at the rear end of the bus. They discussed books with each other and seemed at-ease inside the bus.

In all, the bus spent about one and a half hours in this school, and was visited by around 100-150 children in all in that time.

4.5.4 FRIISILÄ KOULU

The kids came in along with the teachers and it was the same activity as the previous school. Nearly 30-40 kids along with teachers visited the bus and issued books. The bus didn't wait here for more than half an hour as it was getting late. The school was informed not to send in more classes.

4.5.5 CONSOLIDATED OBSERVATIONS

Each child got almost half an hour inside the bus. The activities in the bus involved browsing books, making a selection, queuing up towards the librarian and issuing out the books. The activity is very straightforward and the time is just enough for all children to get a book and return to their classes. This brings up a very challenging situation in the modern bus with media tools – how can children interact with media tools in such a short period of time.

At times there are 50-60 children inside the bus. In extreme rare situations the librarians have to call the daycare center to inform them about their arrival. Normally the teachers know that the bus is coming as the timetable is already fixed in advance for almost an entire year.

Teachers usually know exactly where to look for books. The shelves are well organised and classified according to the needs of various age groups of children. The books are long and thick for kindergarten children and therefore are placed either at the bottom level or mid-level height. 30-40 children can comfortably manage inside the bus but the place becomes crowded and difficult to move around.

The children are supremely happy to be in the bus. Approximately 500 books were issued out in the whole journey i.e. within 3 hours but no one used the self-issuing computer that occupied one small corner. It definitely went unnoticed and somehow the whole system seemed perfect to have a personal assistant who would help in the process.

“We love the personalised service given to us by the librarians in the Library bus”. This was said by a parent during an interview.

The librarians are very happy otherwise with their jobs but finds the sitting area too congested and would like to have more room near the driving area. It’s also difficult for them to drive through narrow lanes during the winter times.

INTERACTIONS	SPACES	ARRANGEMENTS
<ul style="list-style-type: none"> ▪ Half an hour per child interaction in the bus. ▪ Short period of time media interaction. ▪ Activities involved: Browsing, selecting a book & queueing up for borrowing, returning the book. ▪ 50-60 children came inside the bus at a single time (gets very crowded). ▪ Approximately 500 books were issued out within 3 hours. 	<ul style="list-style-type: none"> ▪ Librarians sitting area is narrow & congested. ▪ 30-40 children can accomodate easily inside the bus (becomes difficult to navigate). ▪ Queueing up makes it difficult to access some shelves. ▪ A shelf dedicated for displaying stuff for decoration is too large and unnecessary. 	<ul style="list-style-type: none"> ▪ Books are arranged according to the height & age of the children (small children books normally on the bottom shelves). ▪ Personalised service of borrowing books is very important. ▪ No one used the self-borrowing computer. ▪ Teachers are well aware of the books, shelves & arrival of the bus. ▪ Shelves are very well catagorized according to the genre.

.....

4.6 VISITING VIRONNIEMI PÄIVÄKOTI

As part of my design process it was also important for me to form a basic understanding of primary education in Finland, and in order to do that I visited a daycare center in Helsinki called Vironniemi Päiväkoti.

The daycare center is in a central location in Helsinki and operates between 9-17hrs, and I observed the children for an entire day. The atmosphere at this particular daycare center was homely and active. The children seemed to enjoy every minute of their presence in the center. The children were served with a mini-breakfast to start their day full of activities. They were divided into groups and the youngest group were sent to play. The center had organised a storytelling event and the children were taken to the basement of the building to explore an imaginative simulation of the underground water tunnel system of the city. The center exposes the children to various topics through the year, and the main topic for 2012 was City of Helsinki. The teachers try to evoke of a sense of understanding among the younger children and gently touch upon issues such as water conservation, art, architecture etc. The teachers also dress up in costumes to role-play and demonstrate different events in the story.



Imaginative story-telling session at Vironniemi Päiväkoti

The children attended the simulation in batches of 7-8, monitored by a teacher. This event took the entire morning until lunch break. The children were further excited because they had each been given a construction hat. The children enter the simulation space constructed in the basement and are introduced to the topic of city underground water systems and how the tunnel was built. They then proceed to engage in various activities ranging from simulated archaeology to history about the underground tunnels. The children asks questions and are very excited to do the activities, and the youngest among the children get very distracted and wander about preoccupied with their own thoughts and conversations. The basement had huge pipes all over the place and with a little demonstration the children were able to understand how they get light and water at their homes and other places.

As we had lunch, which in Finland is free in all the schools and daycare centers, I had a chance to witness the activities that happened in various groups. Children were asked to take mats to sleep on for a round of guided meditation or imaginative story-telling session.² The teacher asked the children to imagine they were travelling on a magic carpet and were then led by the teacher across various landmarks in Helsinki such as the churches, libraries, museums and other areas that the children were familiar with. After a 20 min. session of meditation in this manner, the children were asked to get into groups for other activities or allowed to play on their own.

I chose to wander about at this point and just observe. Other activities involved signing group-songs to help in remembering numbers, drawing and some of the really young children went off to sleep. The teachers were very busy all the time and I managed to talk to one of the teachers about his opinions regarding his work and about the center in general. A group of children nearby were learning various words in finnish and I asked the teacher if it was necessary for the child to be able to read and write before joining regular school. The answer was negative and that it was the job of the regular school to train the children to read and write. "It's up to the children if they pick up and learn here, it's not forced," he said. I think I felt the culture shock right there because in India it is completely different! Children of that age in India would already be in regular schools learning basic mathematics. I therefore began reading some more about Finnish education and why they are the best in the world.³

2. "Blanca Juti Empathy, Creativity & Courage Archives » Blanca Juti," n.d.

3. "Finland's Education System Best In World - Business Insider," n.d.

4.6.1 OBSERVATIONS

3-4 YEAR OLDS	4-5 YEAR OLDS
<ul style="list-style-type: none">▪ Curious, but low attention span.▪ Excited to meet characters in role-play or costumes in storytelling sessions.▪ Lots of questions.▪ Questions may not be relevant to the topic at hand.▪ Need guidance and assistance.▪ Did exactly what was told.▪ Lots of imagination.	<ul style="list-style-type: none">▪ Curious and attentive.▪ Excited to meet characters in role-play or costumes in storytelling sessions.▪ Lots of questions.▪ Able to express their ideas through visuals.▪ Active in making things.▪ Drawings were neat and expressive.▪ High level of engagement.

4.7 INTERVIEWS & CONVERSATIONS

I conducted a few conversational interviews with parents, teachers and librarians – closely related stakeholders who were not children. My intention was to probe their ideas and concerns regarding this radical change to the library bus viz. the inclusion of digital media tools. It would give me insights into the role of the library bus in their daily life and general feedback upon the idea of the new bus by these three groups. Parents were probably the most important group I interviewed, due to their close proximity to the children I would be designing for. Their insights into how their children, or even the generation as a whole, related to technology would help me devise a framework of expectations regarding the service ideas for the bus.

4.7.1 PARENTS

There was a clear focus to this interview. I wanted to know three aspects from the parents’ point of view: role and use of the library bus in their daily life, usage of media by children at home and leisure; and critique on early ideas of the new bus.

QUESTIONNAIRE FOR PARENTS

Basic:

- How many kids do each parent have?
- How old are they?
- Which Grade they are studying in?

Library related:

- Have you visited a Library bus service? How many years ago? What was your experience like?
- Have you noticed any changes in the service over the past years?
- Have your children used it? Are they excited about it? Why? Why not?
- How often do you and your children visit a public library?
- Other than books what else do you and your children visit a public library for? eg: CDs, DVDs, music, ebooks, games etc.

Media related:

- What kind of media are the children exposed to (at home, in school)?
- Do they enjoy playing with media tools?
- What kind of activities do they do on these devices? eg: games, books, videos, drawing etc.
- How much time do you think they spend with these devices, reading books or just playing? Who do they play with?
- What do you feel are the effects, on your children, of these media tools?

The new library bus service:

The new service combines books with electronic media tools; the idea being to provide children with a platform that combines learning and playing.

- What are your immediate reactions to this idea?
- Would you and your children visit this bus beyond regular hours?
- What would you like to see included in this service?
- What problems or difficulties might arise out of this service?

The interview was interesting and insightful. On the following page, are the collated insights from this interview.

PUBLIC LIBRARY & LIBRARY BUS	MEDIA USAGE BY CHILDREN	NEW BUS CONCEPT
<ul style="list-style-type: none"> • People visit the public library weekly or fortnightly. • Libraries have emotional attachment. • Children enjoy music-listening spots. • Children’s section in libraries are cosy and fun. • Libraries are hang-out places for people and children. • Library bus is fun and exciting for children. • Librarians are crucial as people like personalised service. 	<ul style="list-style-type: none"> • Play games on media devices at home or friends’ place. • Commonly found media tools at home: <ol style="list-style-type: none"> 1. Wii 2. Television 3. Computer 4. Mobile phones 5. Nintendo • Parents have to restrict usage. • Use computers to go online or do school work. 	<ul style="list-style-type: none"> • Parents were concerned about the media tools. • Major concerns: <ol style="list-style-type: none"> 1. What is the new service that the new bus is offering? 2. How will media be used other than just browsing e-books or games? • There was a slight resistance towards technology and media tools. • The concept of the new bus was accepted, once explained.



Parents from Espoo

4.7.2 TEACHERS

4.7.2.1 JÄRVITORPPA PÄIVÄKOTI

Taking time aside from the workshop with the children from the Jarvitorppa Daycare center, I spent some time quickly interviewing two teachers from this school and made a note of their observations regarding the workshop and the proposed media facilities in the bus .



Teacher from Järvitorppa Päiväkoti



Teacher from Järvitorppa Päiväkoti

According to the teachers, the children enjoyed the workshop and loved the idea of Petri the book doing things that they willed it to do. The children also enjoyed drawing inside the book. Their attraction towards the book was curious and finding a blank book was a bit of a surprise to them. The children wanted the book to have more character – a mouth to talk and eyes to see. However, they did understand the fact that the book can still do everything for them. They could make it drive a car or turn themselves into a princess. The idea of magical or fantasy was very evident in their actions. What the teachers found interesting was that the children touched and interacted with the book as much as possible. The children were curious and thought that something would, at some point, emerge from the book.

The children were also very specific about their likes. No one mentioned anything they disliked. It was interesting to discover that the shy kid in class could express herself very well through explaining her favourite book; while the talkative one denied the fantasy of the book altogether and refused to acknowledge the teacher as Petri. Though initially, there was some resistance to the idea that books talk, walk and feel things; during their interaction with Petri, they engaged freely.

.....

When asked what kind of technological tools do the children use at this age, the teacher noted that , “Every child here knows how to take at least a picture on a mobile phone”. As a teacher, she was comfortable with the idea of having books and simple fun media tools inside the library bus.

4.7.2.2 MARTINKALLIO SCHOOL

I conducted another workshop with the children of Grade 1 at the Martinkallio school. The teacher’s reactions to the workshop were very positive, and she wished for such activities with the children to happen at regular intervals. She was excited with the idea of media tools inside the new bus. The teacher played with a couple of applications on the iPad while supervising the workshops with the children. She was really happy to see her children use the applications which allowed them to sing, draw or even read a book. She liked the idea of using iPads as educational devices for her children in school. She said, “children are allowed to use school computers if there is a project work that needs it. Otherwise, they generally might use media related tools at home”. The fact that the boys were so engaged playing games on the iPads gave me an insight to the amount of technology they already know how to use in their daily life.



Teacher from Martinkallio Koulu Grade 1

4.7.3 LIBRARIANS

4.7.3.1 ESPOO LIBRARY BUS

I took a ride in Troll Boy, the Espoo library bus, that went round to different schools and daycare centers. The librarian who also drives the bus gave me some information about his job and provided me with the information that was needed to understand the current system.

He complained that the seating provided for the librarian to return and issue out the books was congested and uncomfortable. He also felt that driving through the snow in winters on narrow lanes is a problem. It was from him that I also learnt that the general public is unaware about the timings of the bus visiting their locality and thus, do not come to the bus while it is waiting outside a daycare home or school. All in all, he stated that he enjoys his work and his job.



Librarian from Espoo City Library



Librarian from Espoo City Library

4.7.3.2 SELLO LIBRARY

Visiting the Sello Library in Espoo, I met a librarian who emphatically stated that library buses are very boring and a change needs to be brought about in the way these buses function. He mentioned that the Library Bus festival, that took place in Turku in 2011,⁴ made him feel bad about the fact that the buses contained only books and nothing else exciting on display or to interact with.

He was excited to contribute his ideas for the new bus, and was excited at the prospect of having media tools along with books in the new bus. He also suggested that efforts be taken to get young people and teenagers excited about the bus. In his opinion, the bus should carry more than just books and, in fact, could even

.....
4. youtu.be/jCY2Y2UX6Wc

offer facilities such as lending skating equipment and such. This was quite a groundbreaking insight and validation for me, as by this point I had already been thinking through similar concepts for the new bus.

4.7.3.3 KALLIO LIBRARY

Speaking to a librarian at the Kallio Library, when I was there to check out the self-borrowing machine in the children's section, I learnt that not many children use the machine to check out books. Borrowing is generally done with the help of a librarian or their parents at the library service desk. The focus of my visit here was the self-issuing machine, and I didn't inquire about anything else.

5

Challenges & Opportunities

The project began with a lot of questions, answers to which became the foundation to all the design solutions. Insights from these are compiled here as challenges and opportunities that formed the guiding principles behind the final designs.

5.1 MEDIA

The public libraries in Finland do emphasise the integration of modern technology through the inclusion of digital media and technical facilities for people. The machines for self-issuing and returning of books, computer workstations, large displays for internet browsing, playrooms, XBox Kinect games, storytelling, music stations etc. are all available freely and in large numbers in most libraries, in addition to the regular books and DVDs.

5.1.1 MEDIA TOOL SELECTION

It was important for me as a designer to understand the need for media tools inside the bus and in what ways would it benefit the children as a part of the library service. The initial conceptualisation of the new bus by the Espoo city library described a need for media tools as a means to learning and connecting to information in the digital world. Along with information and learning, digital media tools commonly bring with them a host of concerns from their parents and educators, especially when it comes to unsupervised internet access, violent games and other objectionable content. Utmost care, therefore, has to be taken while designing media content for children.

5.1.2 MEDIA CONTENT

The way media is portrayed and generally used in the library now, is mainly for playing games and finishing project work (observations and interviews with

librarians). I built upon this very observation to design an understanding of media tools used differently in the bus service. The notion of computers, mobile phones and other devices used mainly for playing games was something needed to be addressed. It was crucial to the success of the project that this perception be changed for society to be able to accept media usage naturally as a source of knowledge and information from across the world and as safe as a book from the library shelf. There had to be a way to bringing media to the children, beyond games and documents, to facilitate creative imagination and play.¹

A growing number of parents feel that there may be trade-offs between 'reading books' and 'using a computer' that could result in compromising their children's learning experiences. Yet, other research shows that the presence of technology may actually increase the presence of books in people's lives living in the United States. This same trend was seen in Denmark in the early 1990s when Internet access was made available in Denmark's public libraries and library users increased substantially.²

5.1.3 COGNITION OVERLOAD

Children, today's digital natives, are accustomed to accessing technology everywhere. They are surrounded all the time with ever-new and seductive technological devices. Today's children are bombarded with a lot of activities related to technology; whether it be playing games or writing reports. Every child is familiar with modern media and its usage but, there is always a balance that needs to be struck between old and new media for young minds. Within a small space like the library bus, it is easy to overestimate their familiarity with technology and shower them with too wide an array of devices which would hamper their cognition and lead to confusion and disarray in the bus.

Technology takes a special place in the child driven learning environment as a powerful tool for children's learning by doing. Computers, video, and other technologies engage children with the immediacy they are used to in their everyday lives, and bends it to a new pedagogical purpose. It is not what equipment is used in the bus, but how that equipment is used that will make the difference.³

1. Seymour, 1980

2. Druin1234 et al., 2007

3. Strommen and Lincoln, 1992

5.2 TIME

5.2.1 PER STUDENT

The library bus has its own periodic system for the schools, and limits its time at a school or kindergarten to only one and a half to two hours, leaving each class to spend a maximum of half an hour inside the bus. The current range of activity inside the bus is pretty straightforward: children arrive with a teacher, browse the books, make a selection, join a queue, show their library card and issue-out books. I observed that the children are constantly on the lookout for new things inside the bus. They are curious and excited to come into the bus and choose books to issue out. There is a lot of activity and noise when the classes come in and needless to say it's does not resemble a regular library. These are times when the meaning of the bus itself entirely changed. The bus became a hub of joy and excitement rather than just a mere collection of books for the children. The time inside the bus to explore and simultaneously choose books was too short and limiting. It was my immediate observation to extend the time inside the bus for children, in order to facilitate interaction with the proposed media.

The shelves inside the bus are very organised, and each grade in the school knows where and how the books are generally organised inside the bus. Children like to be inside the bus because they see a lot of shelves with various kinds of books, but are always curious to find out if there is something new for them to interact with.

5.2.2 BUS SCHEDULE

As the project progressed further it became more and more important to consider the system in which the library bus service and the school worked together. The system already exists and the proposed integration of the media tools inside the bus demanded that the system be changed. The library bus service follows a monthly timetable, and each school is visited at least twice a month. The bus starts from the library at 8.45 and visits schools or daycare homes until 12.00. It covers 3-4 daycare homes or schools in a day. The bus stops at each school for 1.5 - 2 hours. Each individual gets at least half-hour inside the bus to make their selection and return to their classes.

It is thus very evident that the time required by each child and each class will dramatically increase as interactions with the media tools will take longer than just selecting books from the shelf. Therefore, a lot of care has to taken by the Espoo Library to coordinate a schedule in collaboration with the daycare homes and schools. The number of children inside the bus is also a factor that is related to the bus timings, as each child should be able to freely interact with the media

tools inside the bus. Extending the time inside the bus for each child demands a new schedule and system design within the library bus service. The implication for me was to design concepts and specify the approximate engagement time for each media interaction. Limiting the number of activities inside the bus was also crucial. However, these limitations provided new avenues to think through and design for.

5.3 SPACE

When the children start queueing for borrowing the books at the librarian’s desk, a crowd accumulates and the other children who were still selecting their books have no space at all to move about in. The space within the bus also becomes very crowded the minute the children enter the bus. Introducing media tools would take up even more space, leaving very little for children to move around in.

5.3.1 LIMITATIONS

Currently, the bus has shelves containing books and DVD’s for children. There is also a showcase, which is maintained by a Library official for the children to enjoy soft toys and special books that are put on display. Other than that there are two librarian’s table and a computer for people to issue out the books. The librarian noted that the most difficult part of the job for them was the cramped space to move around in the bus when the bus is crowded with children. This really provoked me to take some interest in the spatial aspect of the bus design.

The children’s movement inside the bus and the arrangements of the shelves had to have a direct relationship in the design proposal for the concept. The integration of the media tools inside the bus definitely meant more focus on the space and making the bus visually appealing to the children at the same time. The ideas thus started bending towards child-centric design and considering the limitations already imposed by the bus manufacturers; and added to the list of of design challenges.

5.3.2 FIXTURES

The space inside the bus is limited to begin with. It would surely be difficult to accommodate many children at one time in the bus considering that they would all want to spend time interacting with the new media tools inside the bus together. Modularity of the fixtures inside the bus provided an opportunity to think about the utility of the bus from a totally different perspective. This is where I thought was a challenge and a new opportunity to develop not only one system, as it currently is, but many systems that would bring novel experiences inside the bus. One would also need to consider how these systems would fit within a larger system plan.

5.4 CLIMATE

The weather in Espoo, as in Finland, is glorious in summer but summer is short here. For the most part of the year the city is covered with snow. Media tools inside the bus would need special care during the winter time as well as during the intermediate seasons when it is wet and slushy. The interior of the bus is often wet due to snow and slush getting carried in with the children's shoes and jackets. Introducing media inside the bus is challenging in situations where space, time and extreme weather conditions are inclement, yet that is the challenge that has to be met. The interior of the bus should be made in such a way that the wiring and power supplies are adequately insulated and hidden from any humidity. However, the media tools cannot be hidden. Therefore, a system needs to be made in a way that during the regular trips of the bus, the media tools be protected from such damage or children using them should be informed about risks involved.

Seasonal changes not only include the wet conditions but equally the hot seasons. The media tools inside the bus might get heated up, especially powerful computers and projectors. Also, if there are too many tools within a small space there are chances that they might overheat and stop working. Another challenge is to fix all the media tools in such a way that they don't fall or experience shocks each time the bus encounters jerks while travelling over snowy, slippery roads.

6

Participatory Design Workshops

In order to begin creating solutions for the new library bus, it was important for me to understand the target users and their understanding of media and technology. I began my research targeting the children, feeling that the project should leave room for adults to experience the new service once it matures. As a first step I decided to take workshops with some children of varying age groups. I chose to conduct workshops because I wanted qualitative insights into the thought-processes and media-awareness of the Finnish children. It was also a way for me to engage directly with my target users by engaging them in creative activities. Through these workshops at a school or daycare home, I would also experience how schools function in Finland. I wanted to understand how the children use media and what is their understanding of interactivity, as experienced by them through the varied electronic media that they are bombarded with all the time — whether at a mall, at home, outdoors or in school. Technology is quite ubiquitous and I wanted to tap into the understanding that children have of technology at that early age; in order to craft services around it which will not overload them with media beyond their understanding or capacity.

At the same time, I also wanted to understand their perception of books and libraries. It is here that I wanted to bring in participatory design methodologies to understand the children's points-of-view. I availed this opportunity to simultaneously meet and interview the teachers who helped me facilitate the workshops. Due to my lack of Finnish language skills, I always had a friend along with me who shared my design background. I wanted someone who understands design methods and design thinking to help me glean valuable insights during the workshop. I also took care to not try and engage with too large a group and dilute my focus on individual children in the process.

As I began designing the workshop activities, I realised the need to introduce some triggers that would help elicit responses that would serve as insights for me. I therefore created props for each workshop with the three different age-groups. The overarching idea was to keep the books in focus, while trying to gauge the children's perception of technology and media devices. My previous research and surveys had proven emphatically that books needed to be the focus of the library bus. While planning the workshops, I sought to engage the children and grab their attention and creative imagination through situating my workshops squarely within fantasy. I employed the use of hand-crafted props with embedded devices as I didn't want the children to perceive media tools as separate objects but somehow woven into our regular lives. Finally, I wanted to examine the idea of a book becoming a piece of technology when it starts to move, dance and do other activities at being commanded. These workshops helped provide me with rich qualitative data upon which I could base my recommendations about media usage by children and their perception of media interactions.

Workshop plans and more details for the following workshops are included in the Appendix.

6.1 JÄRVITORPPA PÄIVÄKOTI

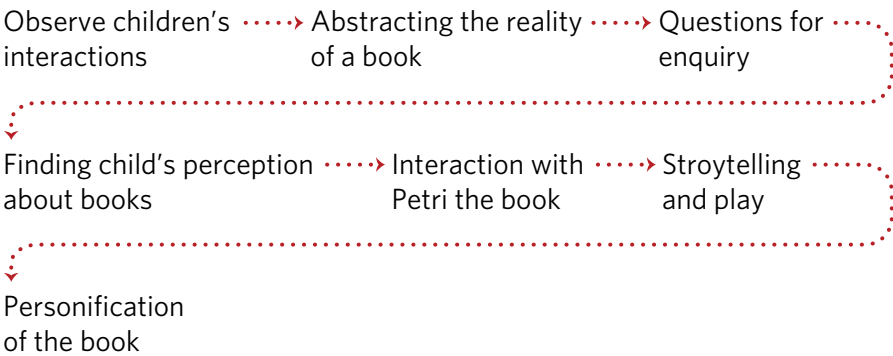
What interaction might children understand best even as toddlers? Maybe the pressing of a button and the response arising from that? It was important for me to establish causality in this workshop without getting too complicated or contrived. Also, I wanted to interview the children but a questionnaire for such small children made no sense. I wanted their immediate and unfiltered thoughts and responses to my questions, and in order to achieve that, I selected a format familiar to all children — storytelling. Through the story I would try to get them to interact with a tool or device.

Simultaneously, I wanted to get a feel for their unspoken thoughts via drawing. However, I did realise that these children were so young that they could hardly draw anything that would make sense to an adult. Thus, it was quite challenging to craft a workshop for 3-4 year olds, eight in all, that would help me gauge their ideas/thoughts/reactions towards technology and interaction. I had half a day in all to run my workshop, a translator friend and two teachers to help me understand the children's responses.

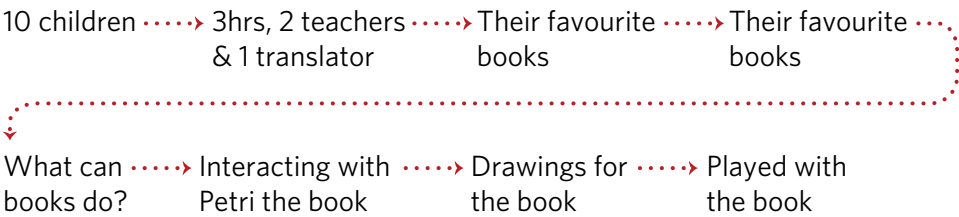
As I was dealing with books and libraries, I decided to tell the children an imaginative story which could lead through storytelling to roleplaying. It had to be a fun activity for children and therefore I decided to use a prop which would help

add some context to the children’s imagination. A series of gentle prompts would allow them to discuss their ideas and imagination.

Aim of the workshop



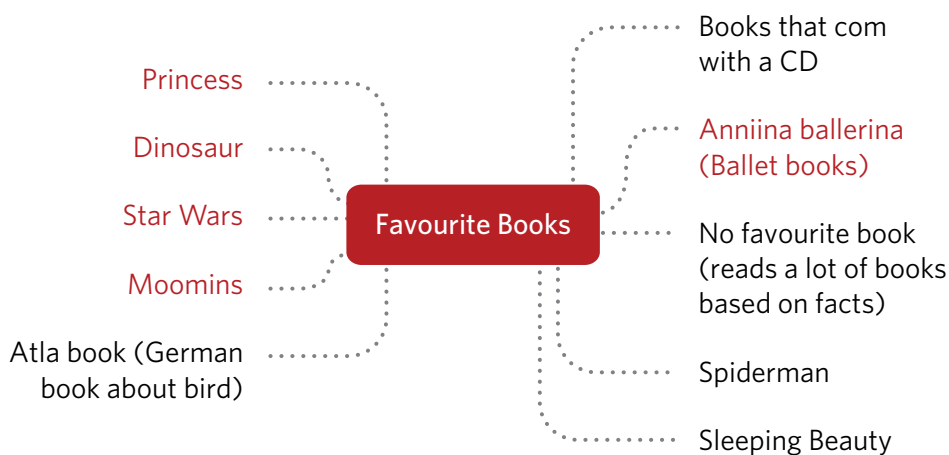
Activities for the workshop



After a minute or two of imaginative storytelling, I let the teachers ask the children about their favourite books. The responses were enthusiastic and varied — a long list of books was related to the teachers. As I documented this discussion, I moved into the next part of the workshop where I asked the teacher to step into the role of Petri the book by wearing the prop around her neck.

I had planned to use the prop to initiate the workshop, and also to make the children interact with it. Petri the book was my metaphorical stand-in for real books and technology, and I wanted to see how the children related to it. I noticed that the children took a close look at the big book that the teacher was wearing and naturally became very curious to know more about it. They began asking questions such as, “ Why is the book blank?” “Can we touch it?” etc. I asked the teacher to let the children to draw things that they would like to see in Petri the book inside the prop itself. This activity led to some very interesting results.

.....



Teacher enacting a story in Järviatorppa Päiväkoti



Children & teacher talking about favourite books

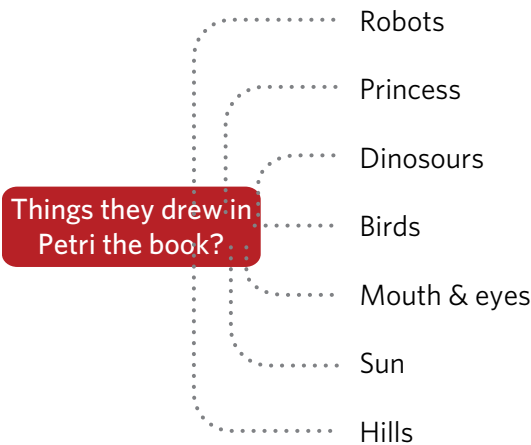


Children's drawing on Petri the book (workshop prop)



Children drawing pictures inside the book

As the children took their time over the drawings, I had a chance to ask my translator if there were any interesting things that had come up. As she quickly took me through the list of things that the children had said, I realised that I was already beginning to see the kind of vivid interest the children have in a wide array of books and topics. It also surprised the teacher to find out what they read at home, “ I have never heard about this German bird book that this little girl reads!” she recalled after the workshop.



A child's drawing from Järviatorppa Päiväkoti

I moved onto the final stage of the workshop where the children had to now do something for Petri. They can do anything — dance, play, make it sing etc. The idea was to break away from the normal mode of interacting with books. The children needed to imagine that a book could be interactive. I wanted to seed the juxtapositioning of technological tools (that move and do things for us on demand) and books (which don't move or animate but are equally informative) in their minds. Both children and teacher enjoyed this part of the workshop. The children danced, enacted and fully participated in this little act.

.....

Things they made
Petri the book do

Make them
Princess

Teaching
Ballet dance

Playing teacher

Motor or
car driver

Fight as DARTH VADER
from Star Wars

Do magic



Children role-playing for Petri the book



Children role-playing for Petri the book

Through this activity a very interesting insight, observed by the teacher, came to fore: a child that normally did not talk was telling some very interesting stories to the teacher, whereas the child who normally was talkative did not accept at all the abstraction of Petri the book. For the latter it was her teacher acting with a book hanging around the neck. The teachers felt that these activities really stimulated some children to open up more and tell stories in their own imaginative manner, spontaneously and naturally.

After this workshop, these were a few insights that helped me draw up a list of recommendations to the Espoo city library as guidelines to organise activities for this age group of children. Children are very curious at this age and therefore props are very essential to get them to start talking, or get them excited about a particular topic. They demand constant attention and therefore keeping them constantly occupied is very important. They are able to express themselves through role-playing and storytelling; and play should be a central part when planning activities with this age group.

Here are a few insights:

- Attention span is very small at this age.
- Curious to know about the book and everything new in general.
- Accepted the reality of Petri the book (except one!).
- Wanted to touch, feel and interact with the book.
- Excited to draw on Petri the book but didn't turn the pages to draw beyond the first-page.
- Needs lots of engaging activities to hold attention.
- Express themselves more through role-playing and imaginative storytelling.
- Props help them open up.



Children drawing pitcures inside the book



Child drawing pictures for Petri the book

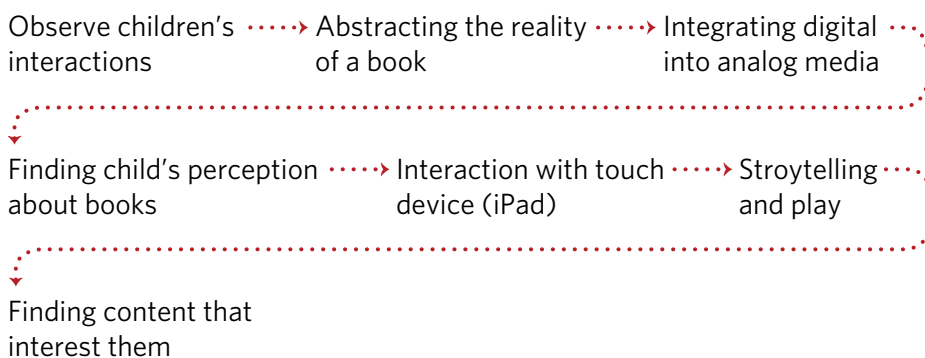
.....

6.2 MARTINKALLIO KOULU GRADE 1

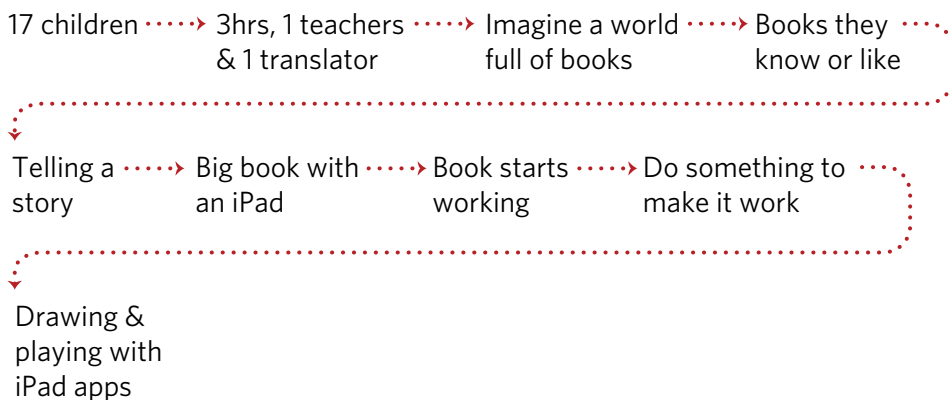
After a fun-filled workshop with the daycare home children, I planned a workshop for seventeen children, 6-7 year-olds from Grade 1 at the Martinkallio school. This was my first foray into mainstream schools and I wanted to the workshop to be engaging and fun. I had a half-day to run the workshop with the help of a teacher and a translator friend. The central idea was to create an experience around a single media tool which is familiar to the children. Quite naturally, I picked an iPad but instead of using it as is, I decided to use it as a prop. I situated it within a large book that I handcrafted, and thus, reapplied my original book metaphor, reverting also to naming the book Petri. This workshop, though, was going to be more than storytelling and role-play. The purpose of the workshop would be to get the children thinking of possible interactions to switch on the book — providing me again with imaginative insights into their perception of technology and interaction.

I was aware that these children were familiar using media tools and I wanted to test how and what they do when asked to interact with an iPad. I also wanted to test a few applications, and towards that end I preloaded some applications that would engage them at different levels. I would observe which kind of application would interest them the most. The workshop wouldn't be limited to simply playing with the iPads either; the children would draw their own stories depicting what they would want to see inside Petri the book. This would lead me towards relevant content which might then be compared with findings from other workshops to reach a common understanding while designing the new bus. I had already begun to realise that content would be the most important thing about the media tools in the bus, and interesting content would be the best foundation for the new bus.

Aim of the workshop



Activities for the workshop



As the introductory story was narrated, I saw a few heads popping up already beginning to respond to the teachers questions — What kind of books do they read? Where do they get their books from? etc. These were questions that I needed direct answers to. The teacher then introduced them to the prop with the embedded iPad that I created. The teacher who was wearing the prop-book had been instructed to not speak to the children at all. As a character, she was instructed to stay dull and wear a sad expression on her face until the children start ‘activating’ her.

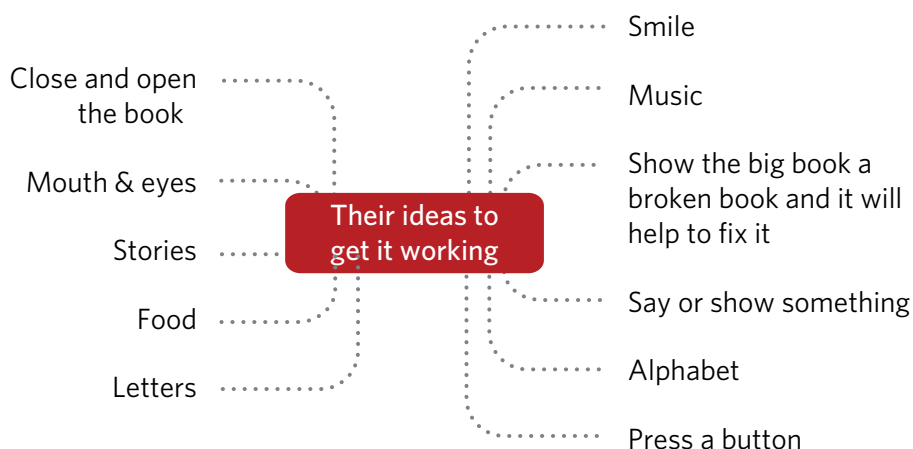
The children tried all possible ways to get the book machine started. They offered Petri the book objects that they found in and around the classroom. They played a musical instrument as a group and tried to get it to work. Some of the children’s ideas were very straightforward and pragmatic: press a button, open and close the book, give it some money etc.; whereas some were more idealistic and emotional such as show it another broken book and it will try to help it fix, feed him food, smile and talk to him etc. I thought these were some really great insights which helped me understand in how many different ways a child could approach and interact with the media tools. These served as inspiration for devising playful interactions between the children and the media tools later on.



Children playing music for Petri the book



Things offered to make Petri start functioning



Once the children made enough effort to try to activate the book, she was supposed to have started reacting. However, the teacher was in a hurry and she had to leave in-between. At this point, I decided to change the plan and started up an interactive book, *The Fantastic Flying Books of Mr. Morris Lessmore*, on the iPad and told the children that the book was now working because of all their love and caring. As the book began to function, it was time for me to give them the iPads to explore the various applications that were available to them.

I split the seventeen children into groups of 3 or 4, and each group chose something different to play with. They explored musical apps, videos and even read some books – both interactive and otherwise. However, most of the videos and books were in English and the teachers had to help translate the stories for them.

I observed that the boys generally enjoyed playing games (they found and played Angry Birds), while the girls enjoyed the Singing Fingers app.

After a round of playing with the apps I wanted the children to not forget the context of the story wherein they had begun with the broken book. As a closure to the workshop, I asked them to draw something that they would like to see featured inside the book. I told them that the pages are still blank and they must make something that they would like to see inside the book. The children produced some interesting and colourful work, some of which are shown here.



Children drawing their ideas for Petri the book



Children interacting with iPad



Children interacting with iPad



Children drawing their ideas for Petri the book

.....

The children were very happy to play with the apps available on the iPad. Some of them even managed to search for new applications and played with them. My observations from this workshop were that children from this age group were able to clearly accept the personification of Petri the book. However, they needed some initial triggers to get involved into the activity. The media content and media interaction kept the groups motivated for longer times. They were active and imaginative in their thinking, and could express their imagination clearly through their drawings, adding craft- materials to support their visuals. Boys and girls demonstrated a clear distinction in their choice of content as well as visual ideas. Most of the girls drew houses, gardens and food related things whereas the boys were drawing guns, president falling from the sky and helicopters. I noticed that the children needed more Finnish language applications on the iPad and when I went searching for some, I was surprised that there was a lack of good apps for children in Finnish. It would also be interesting for the library to seize this opportunity and develop some Finnish content in the near future. However, the children did engage with interactive apps that didn't need language to play with them. Apps such as Singing Fingers were much enjoyed by all groups.

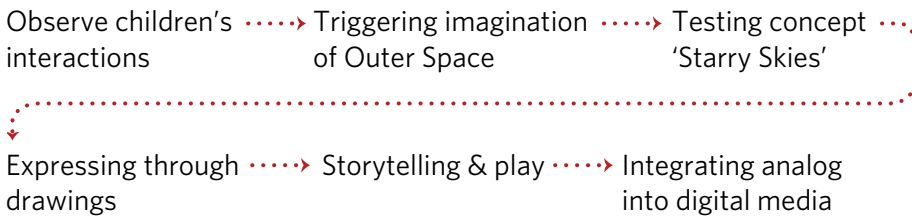
Some other observations:

- Media tools and imaginative scenario kept this age-group engaged for 2-3hrs.
- All activities needed initiation, and some explanation.
- Ideas to get the book working were imaginative and had emotional content.
- They accepted the personification of the book as something that is moving and active.
- Media tools (iPad) needed introduction, but once introduced spread fast.
- Lots of imagination expressed well through drawings.
- Enjoy playing and working in groups.
- Interaction with iPads took up almost the same time as storytelling.
- Finnish language is a barrier, not too much interactive content.

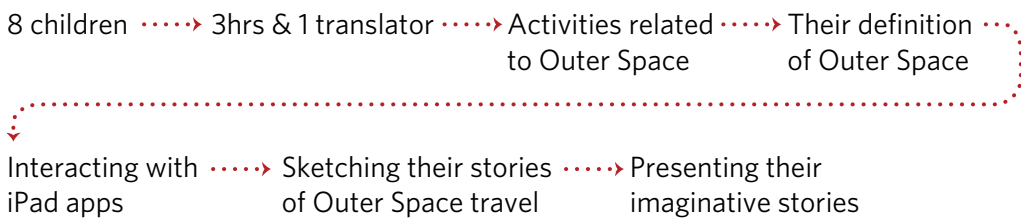
6.3 MARTINKALLION KOULU GRADE 6

Understanding the target users thoroughly was the aim of this part of my thesis, and to finish the user-study it was essential to conduct a workshop with slightly older children. I decided to take a workshop with eight Grade 6 children, in the age group of 11-12 years old. With these older children, I decided to actually test one of my concepts for the bus. This workshop would also be for half a day, but I would only have a translator along with me. I wanted to test whether the children of this age were able to abstract the regular convention of technology and apply it imaginatively beyond its boundaries. I wanted the children to play with iPad, while I made my observations. Of course, it was not enough to just watch them play with the different applications; I also wanted to test their acceptance of the iPad as a fun yet educative device.

Aim of the workshop



Activities for the workshop



Selecting Space as the theme, I had downloaded a few augmented-reality apps and some informational apps (in addition to the apps from the previous workshop). I wanted to understand children's imagination about outer space. I wanted them to be free and as creative as possible. I had pre-loaded applications related to this topic on the iPad and I hoped they would explore most of them on their own without any prompting from me.

There was no teacher involved in this workshop and therefore my translator friend introduced the children to the workshop topic. It was a very simple and straightforward workshop as the main goal was to get them to interact with the media tool and understand how their imagination translated into visual ideas. After the children had played around with the apps for some time, I challenged them to creatively and imaginatively draw their stories about outer space — to imagine space travel from their point-of-view and sketch their ideas out. Adding one more layer to my design brief to them, I additionally challenged them to integrate iPad as a technological gadget into their drawings. In my previous workshop I already embedded an iPad into a book as a prop, thereby mixing the digital and analog together. Now I expected the children to come up with imaginative ideas for the same. They were allowed to create their drawings and realise their imaginations using paper or any other material they could think of in order to make their stories interactive. This would give me some insight into their creative ideas and thinking of the role of technology in their journey to outer space.



Children exploring the augmented reality app on iPad



Children interacting with iPad and sketching ideas



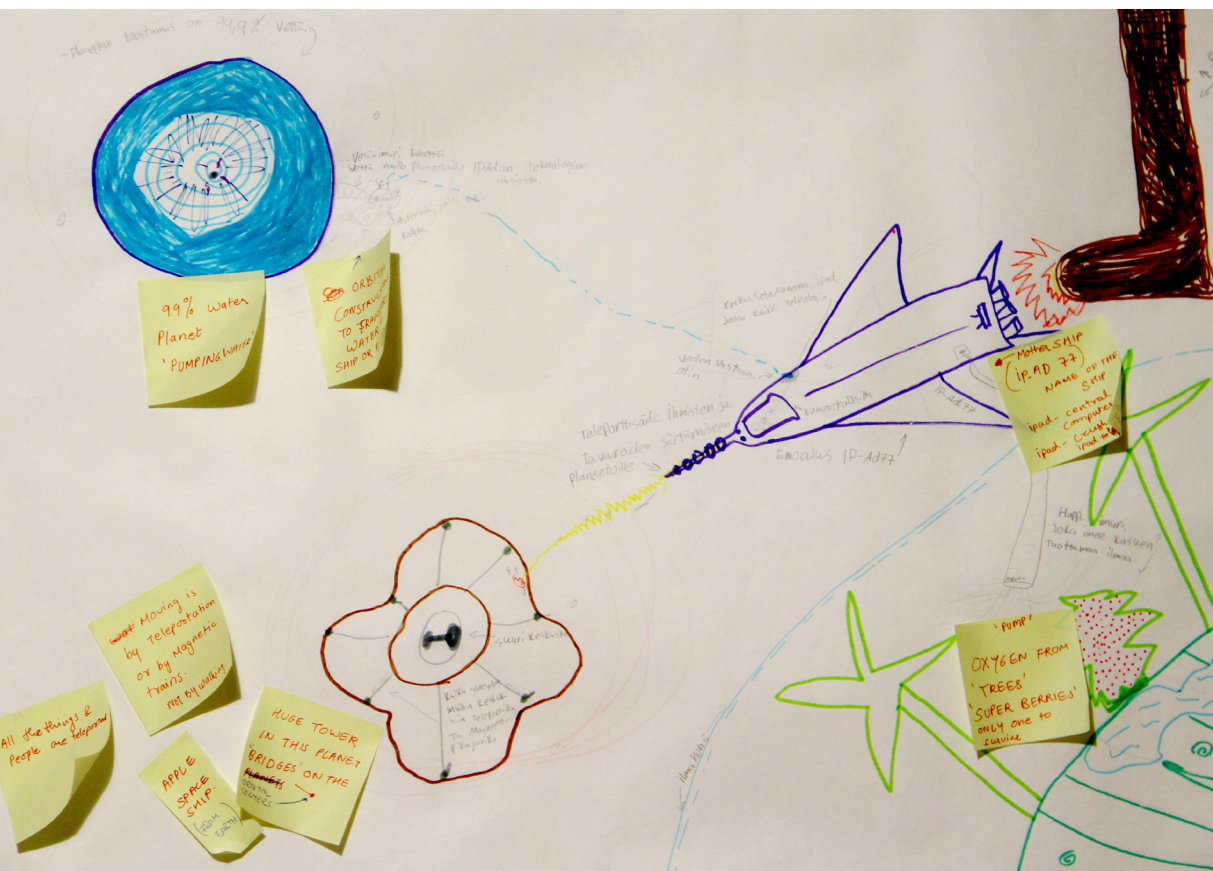
Children exploring the augmented reality app on iPad



Children interacting with iPad

The children enjoyed playing with the different applications on the iPad. The augmented reality app on exploring the skies was enjoyed the most of all. The girls played a lot with the Singing Fingers app and made creative sound-spaces of their recordings. They enjoyed taking photos and videos on the iPad. They spent a lot of time playing with the iPad apps and began sketching out their ideas in groups. The applications on the iPad did serve them as inspiration for creating their drawings and ideas of space travel. The children were very comfortable and engaged readily with the brief given to them.

As they fleshed out their ideas I observed a lot of food-related ideas from the girls in the group. They were travelling into planet full of food, while the boys' drawings showed planets with regular natural resources such as water and plants. Most of the groups used the iPad as engines inside their space shuttle.



Space travel sketched by Martinkallio Grade 6 children

One group of boys had an interesting story where they had to kick their engines manually using their feet to fly the spacecraft. The iPad was also imaginatively utilised as a teleportation device to travel to various planets. This group of boys recounted their story thus: they started out on their space travel in an iPad controlled ship, the IP-Ad77. They travelled by teleporting or by magnetic trains to different planets. They also have an Apple spaceship which is controlled from Earth. All the oxygen is pumped to their spacecraft from plants on the Earth's surface and is then transported to all the other planets through teleportation; all of these controlled strictly using the iPad. They have an orbital apparatus in space above Earth to transfer water to ships and other planets; and it is 99% water.

I observed that children of this age need no assistance and they are capable of fairly advanced visual expression. They made clear presentations and explored almost all the applications on the iPad. Boys wanted more games and the girls were very happy exploring augmented reality applications on the iPad. Their stories showed excitement and fun filled ideas. They could easily see the fit of the iPad into their visual drawings and it was evident that they were looking at the iPad as a piece of technology that could do magical and technically advanced activities in their space journeys. They had lots of imaginative and vague stories but they purely showcased their interests and the joy of mere exploration in an imaginative land. They were very bold in their imaginations and were not afraid to express their thoughts. The children were very curious about my project, and I explained the concept of the new bus to them to gauge their immediate reactions to the idea. They were really excited with the concept of the new bus. "We would love to go into the new bus," said a child immediately.



Children exploring the augmented reality app on iPad



Group presenting their idea sketches

Some other observations

- Could easily navigate through various applications on the iPad.
- Media tools didn't need any introduction.
- Enjoyed working in groups.
- Augmented reality apps got them very excited.
- Outer Space travel stories were related to nature and exploration of new places.
- They integrated the iPad in their stories without any difficulty.
- They used the iPad mostly as engines to take off to the Outer World.
- Their presentation was very clear.
- Lots of imaginations expressed well through drawings.
- Language wasn't too much of a barrier while interacting with iPad content.



Children interacting with iPad

.....

6.4 TIPS TO DESIGN MEDIA/OTHER ACTIVITIES

Analysing all the workshops, I decided to put together a few tips for the library which would help them design workshops for specifically targetted age-groups. These would serve as a general overview on how to design activities that would help children be creative and actively engage with the concepts. Building upon my prior experience and the learning gained from these workshops, I made this list.

3-4 YEAR OLDS	4-5 YEAR OLDS	11-12 YEAR OLDS
<ul style="list-style-type: none">▪ Evoke curiosity▪ Verbal stories▪ Role-playing activities▪ Fresh content▪ Props are essential▪ Basic media interactions▪ Need assistance▪ Trigger imaginations▪ Fun & engaging content	<ul style="list-style-type: none">▪ Collaborative activities▪ Evoke curiosity▪ Trigger imaginations▪ Structured activities▪ Fun & engaging content▪ Verbal stories▪ Hands-on activities (craft, music, play)▪ Fresh content▪ Intuitive media interactions▪ Need assistance for media interactions▪ Free of gender biases	<ul style="list-style-type: none">▪ Collaborative activities▪ Age appropriate content▪ Visual stories▪ Hands-on activities (craft, music, play)▪ Trigger imagination▪ Structured activities▪ Fun & engaging content▪ Fresh content▪ Intuitive media interactions▪ Can explore content freely▪ Need introduction

7

Ideation

Having progressed through the research and contextual inquiry phases, it was now time to put the gathered data and knowledge to use. The first step towards this direction was to brainstorm concepts for the new bus, without limiting our ideas — an activity that I carried out along with the spatial design team. My workshops served here as inspiration for us to understand what the children would really enjoy doing in the bus. As we began to work our way through the constraints and possibilities for conceptualizing the new bus, we came up with lots of ideas as a group which sought to develop entirely new ways of imagining the library bus.

From my workshops, it was evident that the children enjoyed storytelling and imaginative flights of fancy. They also wanted to engage in creative activities, and almost anything new was accepted with joy, curiosity and enthusiasm. Building on these, I cross-referenced my findings with academic papers and was gratified to find the following set of findings that mirrored my own.

Kids want to engage with:

- **Stories:** Children want to listen to stories, read them, experience them interactively, and to create their own. Stories can frame an abstract concept; stories can be a reason to collaborate; they can be a reason to be social; stories can be what engages reluctant learners; stories can enable creative expression and communication; and all of these findings are consistent with much of the storytelling literature in the field.
 - **A relationship with characters in many forms:** Today's children move seamlessly between television, online environments, printed books, and stuffed animals, all because they have formed a relationship with Barney or Big Bird. What has been a recent development is more tightly coupling these various forms, so that one can depend on another for passwords, viral outreach, changes/additions in content.
 - **To be creators, not just consumers:** Before there was Web 2.0, social networking, and IM, there was Logo, Basic, and SmallTalk. All of these
-

programming languages helped researchers to understand how powerful it was to put tools in children's hands, not just interactive textbooks. Seymour Papert reminded researchers that constructivism (by way of Piaget) suggested that children can learn by constructing or creating their own paths to knowledge, and that computer tools could support children as builders, designers, and researchers.

- **Control:** There are few times that children can control their world, without the rules of parents, teachers, or other adults. The reality of computer tools supporting children to exert more control of their experiences suggests new possibilities for learning, identity development, and social awareness. To watch a child placing a new piece of furniture in a virtual room is to experience the ultimate in control.
- **To collect:** Children collect rocks, shells, stuffed animals, pictures, and stickers; the list is endless. This desire to collect by children has not been lost on the creators of Webkinz, Pokeman, and NeoPets. Not only can you buy a stuffed animal for Webkinz, you can choose from any number of physical objects (including trading cards, charms, mouse pads, and lip gloss) that offer secret surprises.¹

I began examining the bus as a space for the children to engage with a wide range of activities, keeping in mind these needs outlined above. The bus had to be a hub of joy and excitement where the children would own the space and engage in collective creative activities.

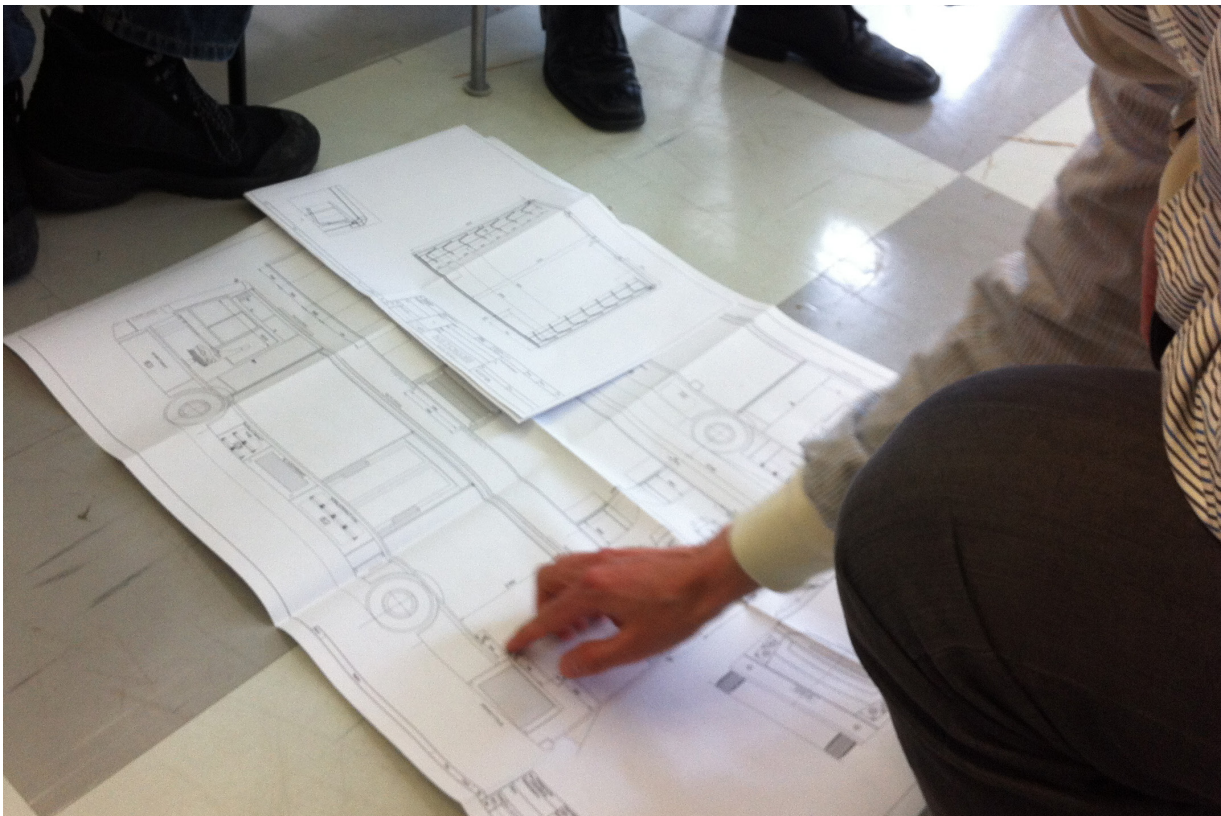
Our ideas, over time, started indicating a modular bus where a wide range of activities can be conducted, in a social and configurable environment. We were aiming at a functional yet fun and educational bus for the children, which could be a free space for the children to engage with new ideas and the latest in media technology. Some of our ideas also aimed at involving young people and parents into the activities inside the bus. We sought to change the system by imparting a modern outlook to the bus through the inclusion of media tools and transformation into a social learning space.



Brainstorming ideas for spaces in the new bus



Brainstorming ideas for spaces in the new bus



Checking the interior spaces of the bus

7.1 BRAINSTORMED THEMES

At this stage we decided to come together as a group and brainstorm possible themes for the new bus. Of the numerous ideas generated during the process, a few select ones are shown here.

7.1.1 ANCIENT EGYPT

The idea behind this theme was to introduce children to a new culture. The concept came to mind because I realised that Finland promotes ethnic diversity which promotes tolerance and understanding.² It is logical to build upon this foundation through interacting with and learning different cultures, especially from a young age. Simultaneously, I also wanted to encourage engaging with history and learning about some of the most intriguing and mysterious stories from ancient Egypt.

This theme allowed me to invent fun activities where the children could interact with information and stories on a multi-touch table, mediated through artifacts and books. The system could also learn and evolve over time to present new content depending on age-group and frequency of use. The theme could also serve as a backdrop against which experts and volunteers could come together and participate creative workshops e.g. simple and fun paper-craft which could be taken away as souvenirs such as small pyramids made out of paper. Other spaces in the bus would allow the children to engage with other content relating to the theme, such as an augmented reality mirror (to try on a pharaoh's crown) or screening short movies. Posters and themed books would bring in elements of a traditional library. Ultimately, it would be a space buzzing with activity and variety. The photo-montage on the facing page illustrates visually my idea for this theme.

This activity would demand sufficient time for the children to engage with, and it would be logical to free it from the constraints of school schedules. This could then take the form of an after-school activity that schools or parents could register the children for. It might take the form of a cultural event spanning upto 3 weeks, to allow for multiple sub-events to be organised depending on targeted age-groups.

Events such as this could also involve specialists and domain experts such as teachers, researchers and archaeologists in this case. Parents and others from the general public could register to actively volunteer. Over time, this would generate a sustainable loop where people could propose and organise their own thematic events and host them in the bus.

Activity: Cultural Event

Approximate duration: 3 weeks

Age group: 7-15 years old and above

Facilitators: Could be librarians, teachers, archaeologists, parents and volunteers

Location:

- School
- Public spaces

Scenario:

- The bus comes to school and can park itself for few hours for children to experience the space.
- Alternatively, it can be a public event and location could be decided accordingly
- The idea is to experience different cultures.
- The space can remain constant or progressively keep changing depending on the facilitation or activities planned.



7.1.2 THINGS THAT MOVE

This theme would be centered around construction based play-learning and building things, through exploring physical motion and the diversity arising out of simple rules and building blocks. Subtly, the activities could also contribute to a better understanding of basic physics (simple machines), genetics and evolution. Building on the ideas embodied in Lego Mindstorms, Pico Crickets, Scratch programming language etc., I wanted the children to own their creations and build controllable things that move.

Workshop activities for this theme would be creative in every aspect — the children could draw, sketch, build, break, rebuild and generally enjoy themselves. The activities would be craft-based and also programmatic. Workshops with facilitators in the bus could combine learning of digital tools along with exploration of analog materials.

The recommended duration for this theme would be around 4 weeks spanning over a period of 2-3 months. Targetted at 7-15 year old children, this theme would not fully benefit younger children, as evidenced in my prior research. Alternatively, there could be a possibility for younger children to participate in activities as part of a concurrent theme or event in the bus. The number of children in the bus would have to be limited for such events, as it would be difficult for the facilitators to manage a crowd. This limitation would mean early registration for all parties involved — schools, children, volunteers and domain experts. The facilitators for this theme could be librarians, teachers, artists, lego enthusiasts and hobbyists. Additionally, anyone interested enough could volunteer to share their knowledge at an event.

The scenario explains clearly how activities could be organised by the library. The bus could come to the school as per schedule and the event could continue for several weeks giving children from different classes an opportunity to actively participate and benefit from the theme. The photo-montage on the facing page visually explains some possible interactions inside the bus.

Activity: Creative Workshop with crafts and Lego

Approximate duration: 4 Weeks (Spanning over a period of 2-3 Months)

Age group: 7-15 years old

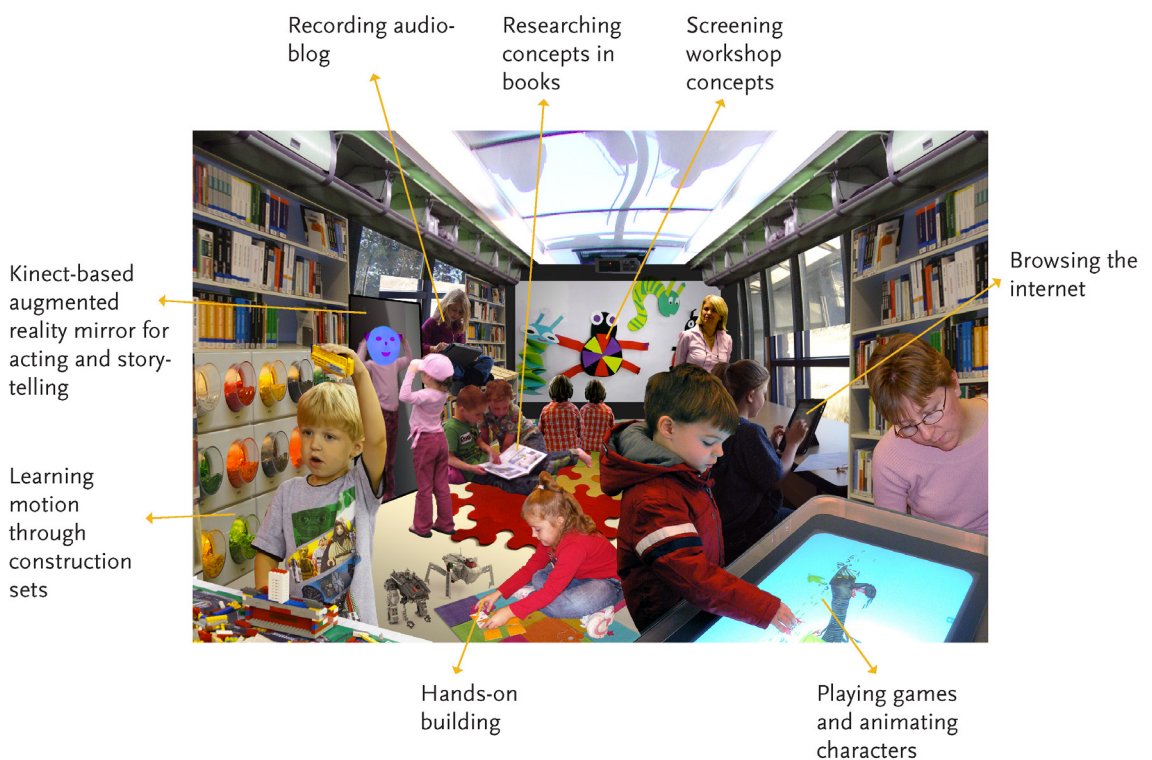
Facilitators: Could be librarians, teachers, craftsmen, media artists, Lego enthusiasts

Location:

- School
- Parks (Sign-up activity)

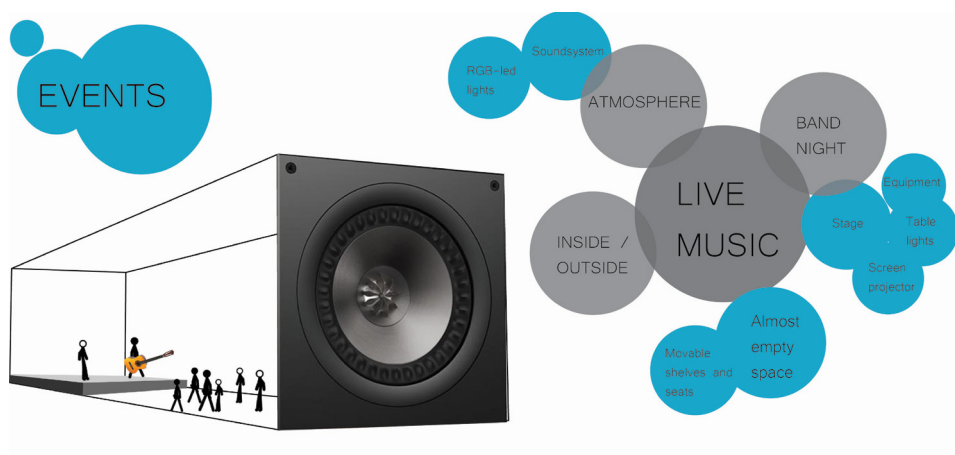
Scenario:

- The bus comes to school on decided days.
- Alternatively, it can be a public event and location could be decided accordingly.
- The idea is to intergrate analog and digital tools to enhance creativity and imagination.
- The activity can be planned progressively over time.



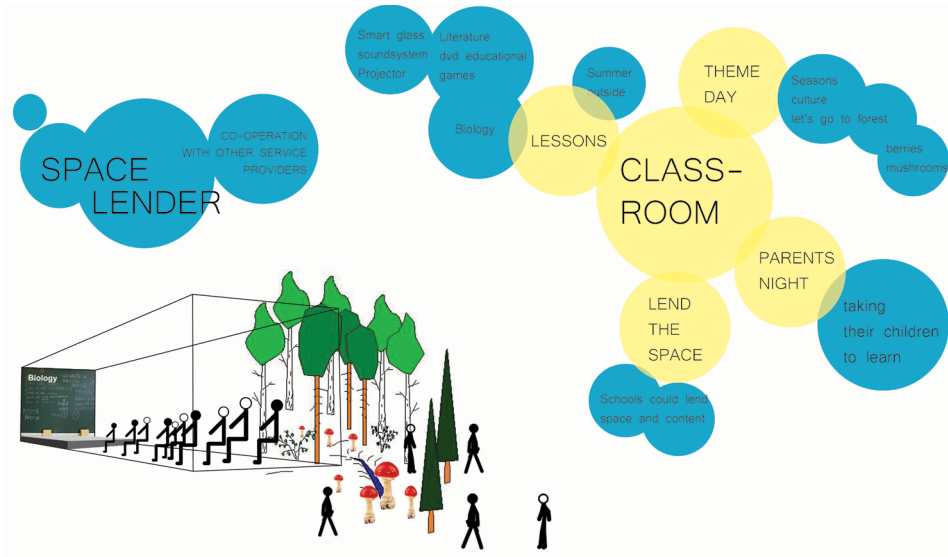
7.1.3 LIVE MUSIC – EVENT

The central idea of this theme was to get people to come together inside the bus just to listen to and experience music. Popular musicians or enthusiasts could also host the event. Listeners and enthusiasts could contribute to share their music collections for listening. During summer time there could even be live bands performing inside or outside the bus. This concept was developed to get teenagers excited about the bus.



7.1.4 CLASSROOM BUS – SPACE LENDER

The idea behind this concept was to rent the bus to people or institutions for a certain period of time to convert the bus into a learning space like a classroom. Teachers and children can come together to organise learning sessions on various subjects such as physics, chemistry, biology etc. The bus also aims to host outdoor activities during the summer time. Parents and other elderly members of the society can either participate or volunteer depending on the nature of the sessions organised.



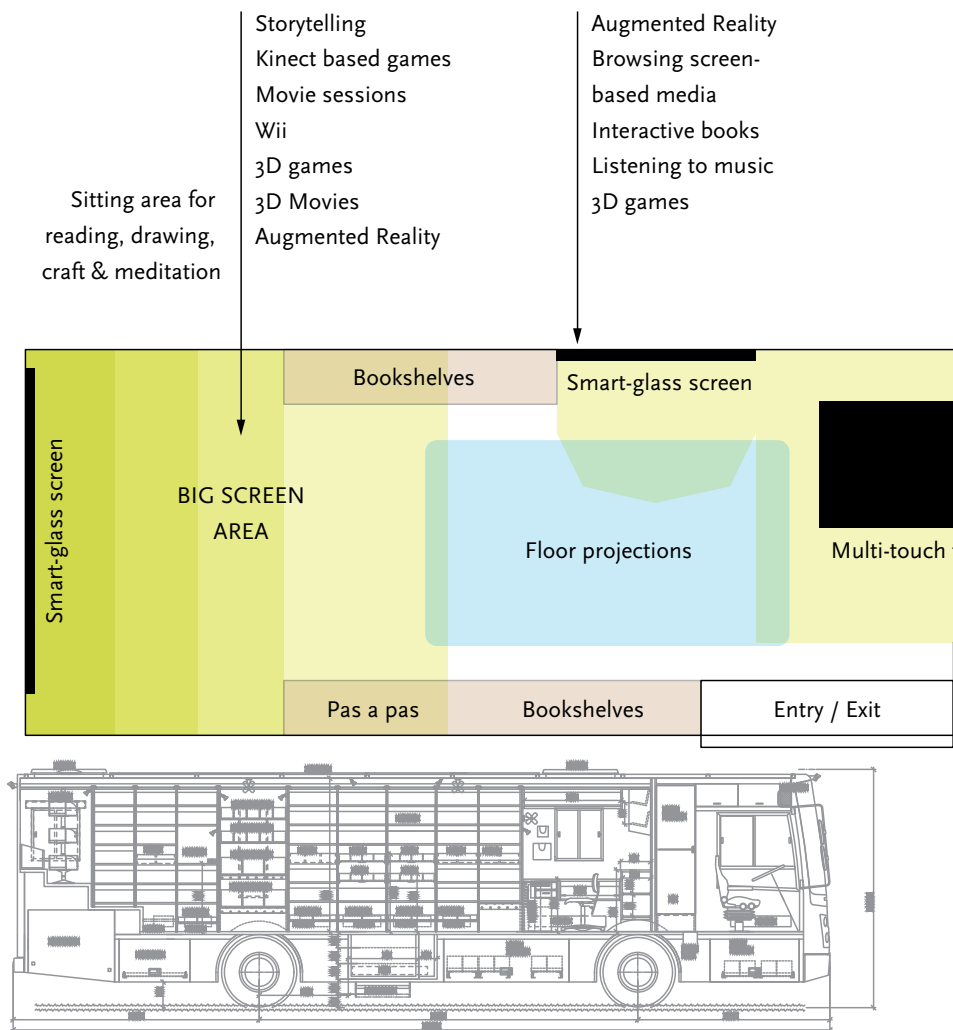
7.1.5 SPORTS AND GAMES

A variation to the above idea would be to let the library bus carry and lend out sporting or digital gaming equipment to people. The focus here was to encourage an engagement with the outdoors and connect it to digital learning experiences. A few ideas are demonstrated in the diagram below.

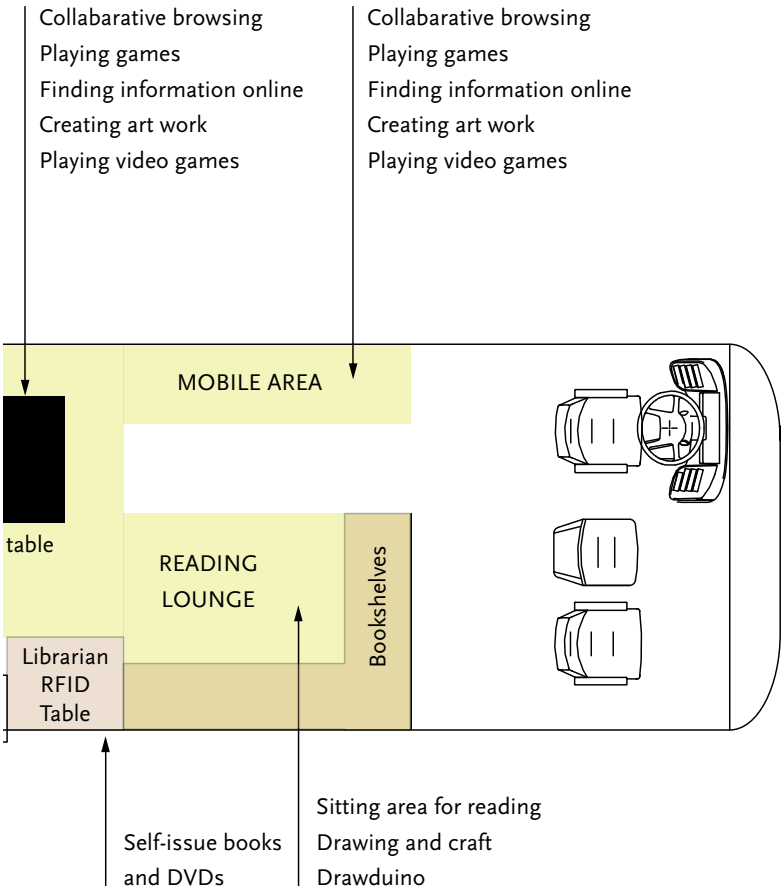


7.2 ACTIVITIES & SPACES

Based upon research and the brainstorming sessions, a list of possible activities in the bus was drawn up. These included activities that were media tool mediated and otherwise. The next task was to visualise how this wide range of media tools and activities could be fit into the limited space of the bus interior. A few sketches of the bus plan were made, of which one is shown below. Attempts were made to optimise for every little bit of space available, while retaining flexibility.



The space was divided into three parts: the front, the rear and the middle. The front area was converted into a lounge and seating area, which could be used as individual personal space for reading or media browsing. The rear of the bus was devoted to a collective space where there was relaxed stepped seating and a large projection screen for video-projection and announcements. The middle section of the bus was earmarked for the multitouch table which had three sides clear for collaborative interaction. These all, along with the bookshelves, would be reconfigurable to suit the theme in the bus. The self-issuing machine would be mounted vertically right next to the entrance.



7.3 SCALE PROTOTYPE

New designs often have unexpected problems. A prototype is often used as part of the product design process to allow engineers and designers the ability to explore design alternatives, test theories and confirm performance prior to starting production of a new product.

A proof of concept prototype is used to test some aspect of the intended design without attempting to exactly simulate the visual appearance, choice of materials or intended manufacturing process. Such prototypes can be used to 'prove' out a potential design approach such as range of motion, mechanics, sensors, architecture, etc. These types of models are often used to identify which design options will not work, or where further development and testing is necessary.

Together with the spatial design team, 1:1 scale proof of concept prototype of the bus was constructed. We used wooden supports and paper to quickly create a space that would give us an idea of how much space we could utilize for shelving and media tools in the bus. The scale model of the bus served as an inspirational basis for us to sit in it and brainstorm the various activities during the ideation phase. The spatial design team also used the prototype to display their initial design ideas by prototyping a wooden table and a few shelves, and displaying a few books in them to test aesthetics and functionality.

Unfortunately, the project took longer than expected to fix on final sizes for the various devices and fixtures, and also the vehicle which would house the mobile library. Thus, the prototype failed to simulate the space with reasonable accuracy, which was the primary reason it was constructed to begin with. However, the prototype did serve as a close estimate of space and was displayed along with the shelves and table, designed by the spatial design team, at the final presentation to the library officials.

The pictures show some of the early renders and ideas for the shelving systems in the bus. Some of these ideas were carried through to the final designs.



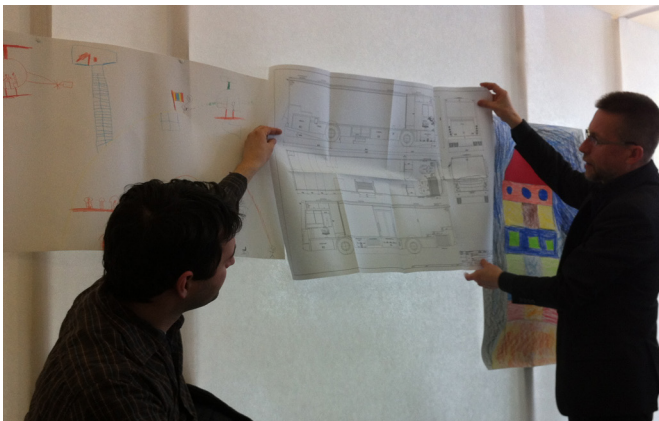
Building a scale model of the bus



iPad shelf render



Prototype with shelves



Brainstorming in the scale model of the bus



Prototype with a table

.....

8

Final Concept

When the concepts were presented to the Espoo City Library, it was decided that a few of the conceptualized ideas would be taken forward as pilot tests. These ideas were then refined and restructured, and final recommendations were presented to the library to take them forward. This bus strives to become an icon of fun-filled activities that serves everyone in Espoo city, not just children.

8.1 MODULAR LIBRARY BUS & THE NEW SYSTEM

The entire design team decided to forge ahead with a modular bus concept. The overarching concept of the bus is an 'empty bus' with modularity at its core. The bus is designed such that all of it can be changed and configured to facilitate the presentation of distinct themes at regular intervals. The easy mobility of the shelves inside the bus and a homogeneous but lively ambience that would suit as many concepts as possible were key factors. The modularity of the bus would allow the space within to be optimised for different kinds of knowledge sharing activities. The spatial designers focused mainly on these interior aspects of the bus, and the concept ideas clearly showcased some of the key elements such as openness of sharing knowledge and the generation of content through active participation of the users.

The new bus would be modular and configurable for any interesting activity or theme. The service idea proposed for the new bus was that the bus should carry themes focussing mainly on collaboration, creation, participation, learning and fun. It can be configured to become a space for learning activities such as sports, gardening, science exploration or crafts. The proposed concepts provide possibilities for the library to collaborate with other organisations and individuals such as science museums, domain experts, enthusiasts, volunteers and collaborators, who would be willing to share their knowledge and time to bring a new outlook to the whole system. The new system allows one the flexibility to think wider and use media as a tool for creative exploration and learning.

A multi-touch table, for example, can be used by the organisers or volunteers to quickly show or demonstrate a topic to the children something as well as interact collaboratively if needed. Media tools were selected in a way that would support both active and passive activities. Children or anyone involved in a particular workshop or theme based activity should not be limited by media tools, related books or other resources that are in the bus. This kind of media configuration allows for combining both print and new media together, and reaching beyond the physical constraints of the bus. Additionally, it promotes the understanding that media tools are modern and important modes of learning devices equally as important as books. This also provides the library with a means to showcase the best available resources to the public who otherwise might not have access to them. The changing themes inside the bus would ensure regular updates of media content and knowledge resources on the library's front. The media content can be visualised as a huge network of ideas clearly categorized as themes.

This system is hoping to attract the young generation who otherwise would not enter the Library bus. The system at it's core is reaching out to people with great themes that people would like to participate in. It envisions to give people an opportunity to express themselves and look forward to libraries that are making an effort to provide open access to technology and other knowledge resources to the general public. It's bringing itself to tell people that it is their right to information and knowledge. The bus does this one step ahead of the library building by carrying these activities and moving around the city stop by stop, ensuring that all people, from even the remotest locations get access to the facilities that they deserve and own. It presents itself to the people and by giving them an experience in an entirely new and modern environment.

The Espoo city library has accepted to face the challenges that the new system needs to undergo. For the system to sustain itself in the long run, the library would need to communicate clearly and often to the public and schools regarding change of themes or upcoming events. A proper sign-up system that would allow early registrations for children or others would help gauge response and also avoid over-crowding. Along with these, also important would be the duration for each event, its frequency of repetition (for people who might have missed it), registration for volunteers or experts willing to help etc. A detailed list of activities and it's publicity would complement the structure of this new system.

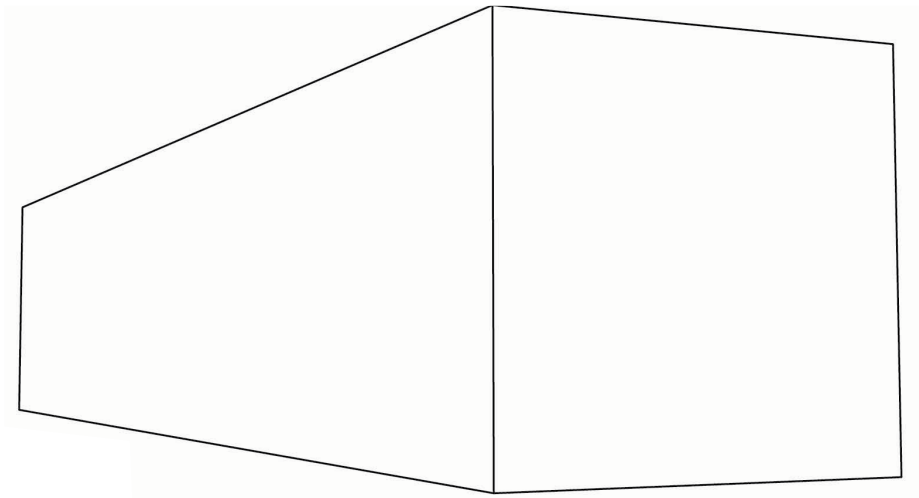
The library has access to topics that interest their patrons, and this would help them come up with ideas for the themes in the bus as well as supporting media. The media tools inside the bus would serve as supports to facilitate rich interactions around these themes. Internet accessibility for referencing

.....

information, sharing knowledge and creativity in an open manner would allow this system to sustain itself.



Empty Bus concept render



Empty Bus concept diagram

.....

Analysis of the Old & the New System

CURRENT SYSTEM	LIMITATIONS OF NEW SYSTEM
<ul style="list-style-type: none">▪ Each class is given half an hour to browse and pick up one book.▪ The bus goes twice a month in the same school.▪ For one child, this is only one hour per month.▪ Nearly 30-40 children can rush in at a time in the bus.▪ There are more than 3000 books to browse from and more than 150 books were issued in a single tour.	<ul style="list-style-type: none">▪ Time for interacting with the media tools is too little.▪ Children must engage with media + books.▪ Also, books can be taken home to engage with; media tools and their content can't.▪ The crowd is too high in number for all interactions.▪ The browsing capacity is reduced to 2000. The bus might have to go around at different timings as well.

Possible Solutions

TARGETS AS SCHOOLS AND KINDERGARTEN	AFTER SCHOOL HOURS AND CATERING TO EVERYONE
<ul style="list-style-type: none">▪ It's an interactive learning, fun and an experiential bus.▪ Organise events and activities around the bus for children to freely participate.▪ On regular days the bus can carry minimal media tools and focus on delivering books.	<ul style="list-style-type: none">▪ The bus organises various events targetting children as well as others.▪ The bus carries different themes which could span over weeks.▪ Libraries expand its target audience and collaborate with other organisations to create the event.▪ Interaction with the media tools differ accordingly.

8.2 MEDIA RECOMMENDATIONS

Based on the concepts proposed during the brainstorming session, it was now important to outline recommendations for media tools that would need to be purchased for the bus. In preparation for this, I reviewed some of my prior ideas on how to use media tools beyond merely as gaming devices for children. I wanted to see media tools in the bus being used for education, learning and fast information retrieval purposes rather than simply as entertainment media; thereby bringing about a change in how parents perceive the use of media by children. At the most fundamental level, the content in the media tools need to be changed in order to keep children engaged and interested. Over time and through regular interactions with the media in the bus, the library-goers could generate a pool of content. This would only happen once the service is popular and known to a large user-base.

There is a basic principle that distinguishes a hot medium like radio from a cool one like the telephone, or a hot medium like the movie from a cool one like TV. A hot medium is one that extends one single sense in "high definition." High definition is the state of being well filled with data. A photograph is, visually, "high definition." A cartoon is "low definition," simply because very little visual information is provided. Telephone is a cool medium. or one of low definition, because the ear is given a meager amount of information. And speech is a cool medium of low definition, because so little is given and so much has to be filled in by the listener. Hot media are, therefore, low in participation, and cool media are high in participation or completion by the audience.¹

Building upon these principles, media tools in the bus were classified into two categories depending on the users' interaction with them:

- Passive media — where children have to sit and grasp the information displayed by the media tool e.g. screen projections or audio tracks. In these kinds of interaction the user passively receives information that's available on the media tools. The tool doesn't demand that the user do much more than sit and pay attention.
- Active media — where the users have to actively look for and interact with information e.g. multi-touch table or iPad. An individual can easily engage in either retrieving some information on a media tool or choose to collaboratively engage with other users. A child searching for information on an iPad could also use the iPad to connect to another iPad to collaboratively play a game or draw a storyboard.

Both categories can support individual and group sessions through the choice of media tool and content.

1. McLuhan, 1994

My goal was to work with existing technology and use them to their fullest, in manners that influence thought and action. It was my intention to broadcast a message of media tools possibly being an aid to make life rich, simple and accessible. It is here that I felt that the concept of integrating workshop like activities could help update new and fresh content in the media tools depending on the theme in the bus. Experts in these theme areas would bring in new ideas and develop the pool of information, which would grow over time to become a rich resource accessible to more and more users. I wanted to leave the power of using media tools in the hands of the user. I wanted them to have full rights over what kind of activities would be run inside the library bus.

Books, of course, would remain an integral part of the library bus. As mentioned earlier, the media tools would, by design, not take too much attention. In fact, some themes and activities were designed specifically to integrate both books and media together.



COMPUTERS	PAS A PAS	MOBILE PHONES
<ul style="list-style-type: none"> ▪ Browsing ▪ Editing tools ▪ Creating art work ▪ Issuing out a book ▪ Playing video games 	<ul style="list-style-type: none"> ▪ Quick interactive tool for small children ▪ Fun and play activity ▪ Media art for small children 	<ul style="list-style-type: none"> ▪ Playing games ▪ Listening to music ▪ Playing music ▪ Networked multiplayer games ▪ Browsing the internet
BIG SCREEN AREA	IPAD'S & TOUCH SCREENS	3D SCREENS
<ul style="list-style-type: none"> ▪ Storytelling ▪ Kinect and Wii games ▪ Movie sessions ▪ Sitting area for reading ▪ Drawing and craft ▪ Meditation ▪ Lego and construction 	<ul style="list-style-type: none"> ▪ Collaborative browsing ▪ Playing games ▪ Finding information ▪ Browsing the internet 	<ul style="list-style-type: none"> ▪ 3D games ▪ 3D books ▪ 3D Movies ▪ Augmented Reality experiences

8.3 SELECTED THEMES

Five themes were selected by the Espoo library bus service, after the presentation of the initial concepts. Whether these would finally be after-school activities or integrated within the regular time table was still unclear. However the sketched concepts would be suitable for both.

These ideas are just a basic understanding of what I as a designer felt would be interesting ways to engage with currently available media tools that the library could start their pilot-run with. The system needs testing and will take time to evolve. Therefore these initial mock-up sketches were very important to the project. This would also be the final level of closure to the project, and the interiors and exteriors of the bus were already being finalised by the spatial design team by this time. It was now decided that the bus would carry iPads, iPods, a multi-touch table and a projector paired with the smart-glass screen at the rear end of the bus. Other media would be included and excluded as and when required in the bus. A new self-issuing system would also be placed inside the bus.

8.3.1 THE REGULAR BUS

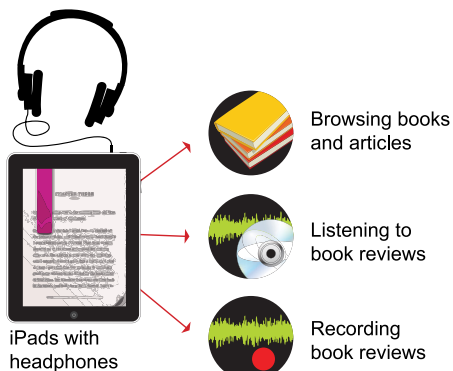
The bus would need to follow the regular routes as it does today. Considering also that it would take some time for the library and schools to agree upon timing and scheduling for increasing time in the bus for the children; I decided to take the current stop durations of the bus and work out a scenario limiting the media tools to only iPads and iPods. Of course, I also designed a scenario for the bus to stop longer and detailed the possible interactions within the bus. However, the second scenario would work only if the schools would agree to schedule more time for the children to interact with the media tools. Another alternative for short durations inside the bus would be to limit the number of classrooms inside the bus and extend the time per class and per child. This would mean that the bus would need to tour at higher frequency, more than the once or twice a week that it does now. This would ensure that everyone gets a chance to interact with the media tools and enjoy the true spirit of the service offered.

For short stops, the bus could carry an interactive board where children could put up quick notes and thoughts for other children to see and comment on. This would be a simple and effective solution which could also serve as inspiration for children to sketch and draw in the bus. It would be interesting to see the drawings evolve over time. The rear-end screen could be used for announcing upcoming events. The iPads in the bus would help search available books, and feature creative apps. Longer stops could have an iPod station which the children could use to listen

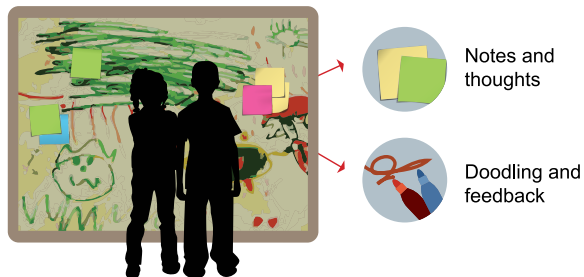
to music or reviews of a particular book. Children would also be able to record the reviews of the books that they have read and hear what others have to say about the same book. The system could be designed to be more intuitive and spontaneous by integrating the recording systems to the books directly, where the children can actually take a book along with them and record their thoughts while they read it.

Combining the books and the multi-touch application idea: An application could be designed wherein children can be in a game like environment. It could be few important chapters from a book or a book itself that has been designed for children for a multi-touch table. Children could interact with parts of the book as a game where they would navigate through different parts of the story, and at certain points, would have to answer a particular question related to the story. At this point if the child doesn't know the right answer to the questions asked in the puzzle, then he can get clues which make him actually find the right book available on the shelf and find the right answer in it to be able to proceed to the next level. Such triggers will not only allow the child to interact freely with the technology but also incorporate the idea of not forgetting to pick up the right book. The application could also encourage the child to issue the book out for him to read it at his own time. The recall value of having such interaction could last longer in the child's memory, as it will bring a different kind of experience playing and navigating on the multi-touch table and then finally getting the right answers and reading then reading the book.

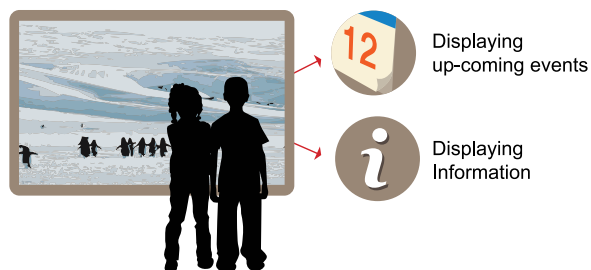
.....



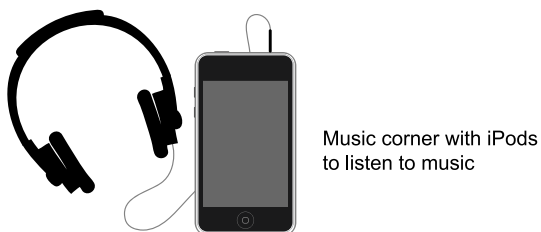
Quick thought board for everyone



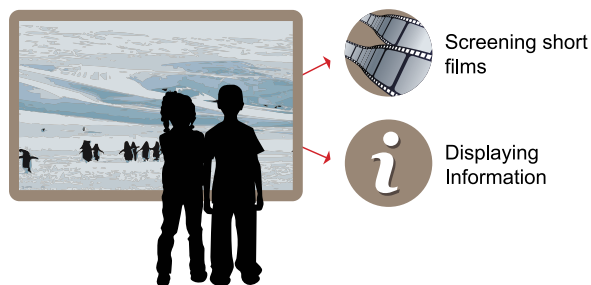
Smart screen at the rear end of the bus



Media tools & Interactions - Regular routes in schools



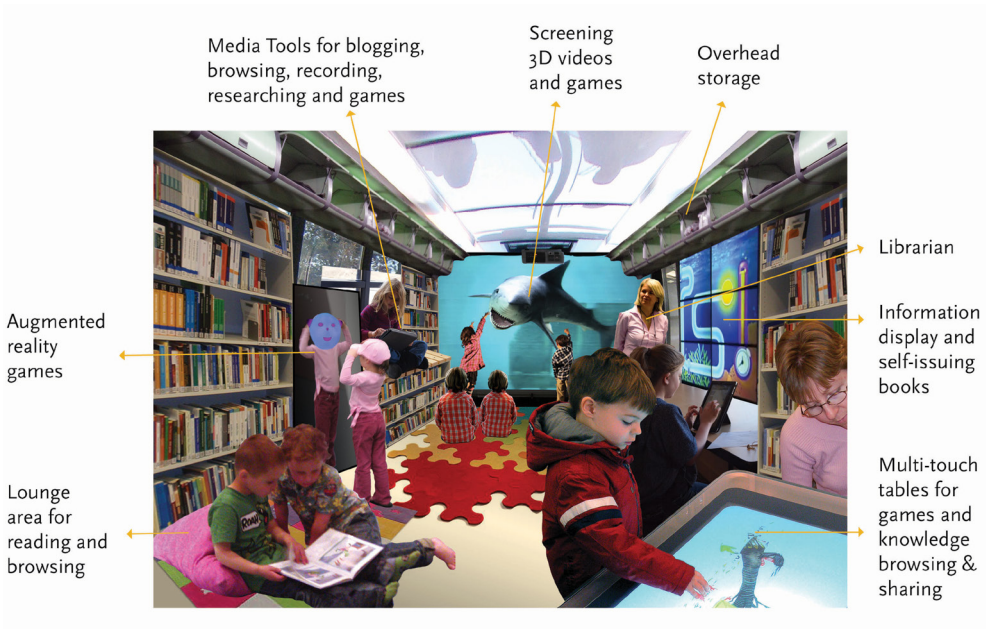
Smart screen at the rear end of the bus



Media tools & interactions - Longer stops in schools



Regular routes - Scenario 1



Longer stops - Scenario 2

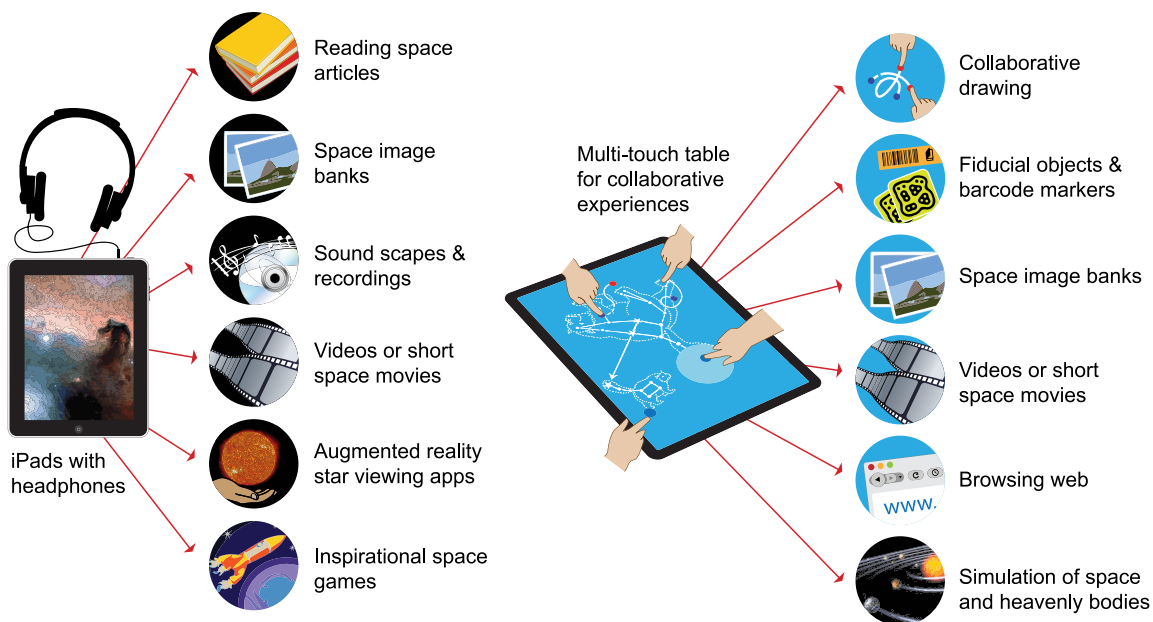
8.3.2 STARRY SKIES

The idea in this concept was to bring together imagination and learning from a child's point of view. The idea was tested in a workshop on a small scale and in the form of creative workshop during the user research process for this project. The goal was to provide an experiential learning environment for children which would bring together play, creativity and education about outer space. Since it is not really very easy to physically go to outer space yet, I thought it would be a great opportunity to expand the beautiful imagination that children have regarding stars, space and universe in general.

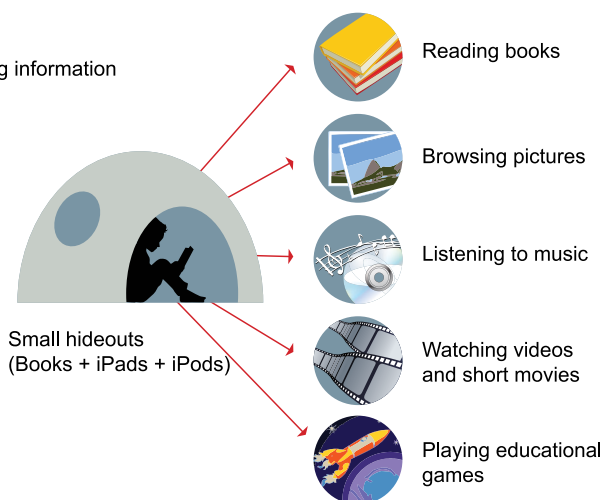
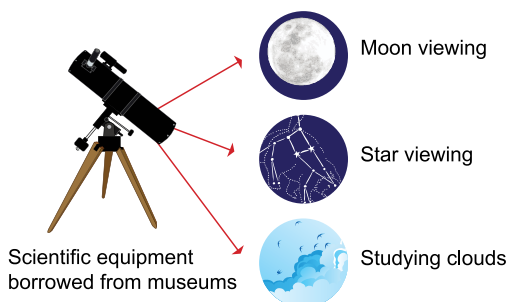
The concept was very simple and straightforward — the library can commission and develop rich content by bringing in experts and enthusiasts from areas such as astronomy, star gazing etc. The library can create an event that brings these experts to the bus in a collective social sharing of knowledge. The libraries could also collaborate with science museums to loan related scientific instruments which children and other library-goers might not have easy access to. The available media tools in the bus would allow children to speedily access related topics on the internet as well as take snapshots of some of the activities. These could then be shared or used for announcements and publicity through social network sites or internal portals by the library. A list of possible media interactions are demonstrated in the diagram below — iPads to interact with applications related to the theme, multi-touch table for collaborative interactions and accessing information, rear-end projection screen to show short movies and videos. Apart from these, there could be interesting spaces inside the bus for children to hide-out and read books or play games on the iPad or even simply dream.

There could be objects tagged with fiducial markers that would allow the user to interact with the multi-touch table through physical objects e.g. children could find out more about the Sun by placing a Sun-like object onto the multi-touch table. It would also be able to situate the Sun as a star within an interactive universe. The multi-touch table would need to have a properly designed interface which would help the children explore information and stories by encouraging them through triggers available to them in the form of fiducial-tagged objects.

The idea of starry skies as an event could be expanded beyond children and be reorganised for people who are willing to learn about the subject. There could be enthusiasts wanting to meet professionals in the field or handle hard-to-access equipment. The library could even consider carrying professional equipments which people could borrow from the bus. The system could allow for the borrowing of equipment and encourage open access and open knowledge creation.



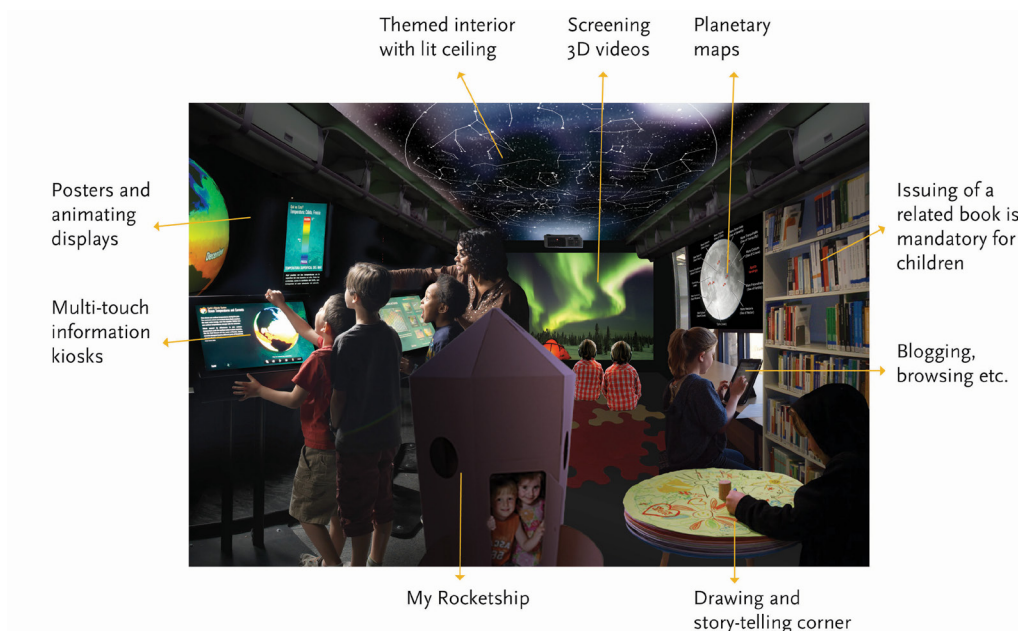
Smart screen at the rear end of the bus



Media tools & Interactions for Starry Skies



Starry Skies - Scenario 1



Starry Skies - Scenario 2

8.3.3 MINI CINEMA

This theme was designed around the concept of parents and children being able to spend time in the bus together. Busy parents hardly get time to engage with their children. This bus provides them with a bridge for that gap. The bus carries a projector that could be used to project movies at the rear-end of the bus for the collective enjoyment of parents, children and others. The library could even encourage participants to bring their own movies to share and play in the bus.

The concept can be converted to become a workshop activity where children and young people can come together to make their own movies in the bus. The bus could carry some basic equipment to scheduled stops and movie-makers can engage with the children and teach them movie-making techniques. Multi-touch table can be used for intuitive touch-based editing, either individually or collaboratively. Movies from the workshop could then be shown at the rear-end screen or shared on social networks or internal portals of the Espoo library.

This theme concept would allow for movie enthusiasts to make movies and learn about movies. The libraries could agree the workshop timings and schedule either with schools or by simply allowing people to sign-up for the activity. This involves an additional responsibility on the part of the library to select participants and gathering experts for the workshop. As mentioned before, a system needs to be developed by the library so that people can comfortably sign-up for the events. The workshop activity can be conducted to a variable schedule depending upon the number of participations for the event. Libraries could also get media companies to lend equipment for conducting the workshops. Media tools and books in the bus would be arranged accordingly so that freshly updated content is accessible to the participants. Depending on availability, there could be other innovative media tools such as Pas a pas to facilitate fun interactions for younger children.²

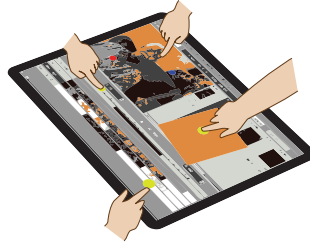
The bus could carry movies to places where otherwise people wouldn't have access to much mobility such as hospitals, rehabilitation centers and old-age homes. The idea there would be to cheer people and encourage them to contribute to and be a part of the new system.



Watching movies
together with
Parents

Screening movies at the
rear end of the bus

Learning movie editing software
on multi-touch table



General activities on media tools



Watching movies



Editing movies



Instruction and
information



Editing and making movies
on iPads and laptops



Tools for animating

Media tools & Interactions for Mini Cinema



Mini Cinema - Watching movies together - Scenario 1



Mini Cinema - Movie editing workshops - Scenario 2

.....

8.3.4 STORYTELLING

This theme was developed specially for small children who like listening to stories. In my research I found that every library organises special storytelling sessions for small children, their youngest patrons. It would therefore be interesting to for the library to find volunteers who would enjoy narrating stories to children inside the bus. It would also be interesting for the library to arrange for a visit by a favourite author. As with the rest, this theme could also be extended beyond children to include other fiction-minded enthusiasts.

Story-telling could also be organised as a workshop activity for children. Children always have imaginative stories running in their heads. This workshop would be focused on creative activities such as role-play, drawing stories, telling stories and drawing those stories out of them. The children could be provided with props, craft-materials and space to organise their own mini-performances. The library would schedule this in consultation with schools, and suitable topics can also be selected accordingly. For example, if a particular class is exploring a particular story from a book then the school or the class can collaborate with the library bus to organise the story event accordingly. Children would use available media tools to explore stories through audio and video as well. The large rear-screen can be used to project short animated stories or movie adaptations of books for children to watch.

The media tools inside the bus can be loaded with content relevant to the event. Applications on the multi-touch table would support collaborative drawings and story-telling. The children could enact characters from a story by 'wearing' virtual costumes activated through RFID tagged storytelling props e.g. a child wearing a RFID tagged hat that is detected by a kiosk, could then be augmented with costumes and masks in an onscreen display. Additionally, the application could display information about that character and perhaps take a picture. This would allow the children to build their own stories wherein they themselves feature as the characters.

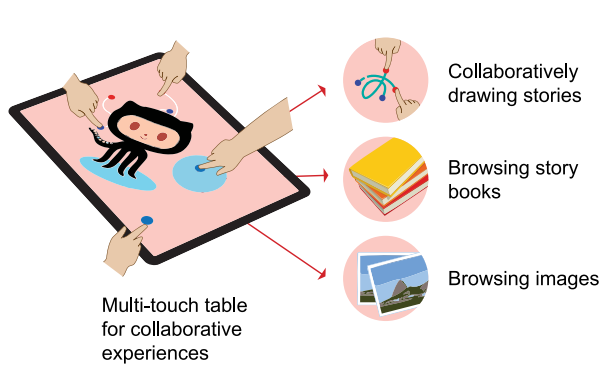
Using rear end screen for narrating stories



Props and costumes



Drawing and craft material



Watching movie adaptations of books on the smart screen

Media tools & Interactions for Storytelling



Storytelling - Listening stories - Scenario 1



Storytelling - Making stories - Scenario 2

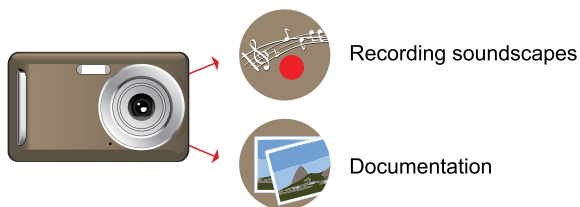
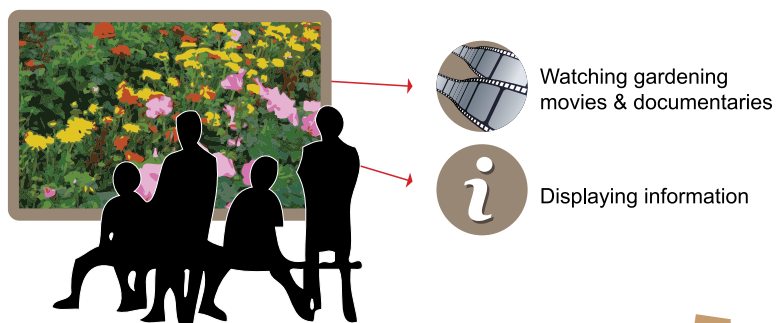
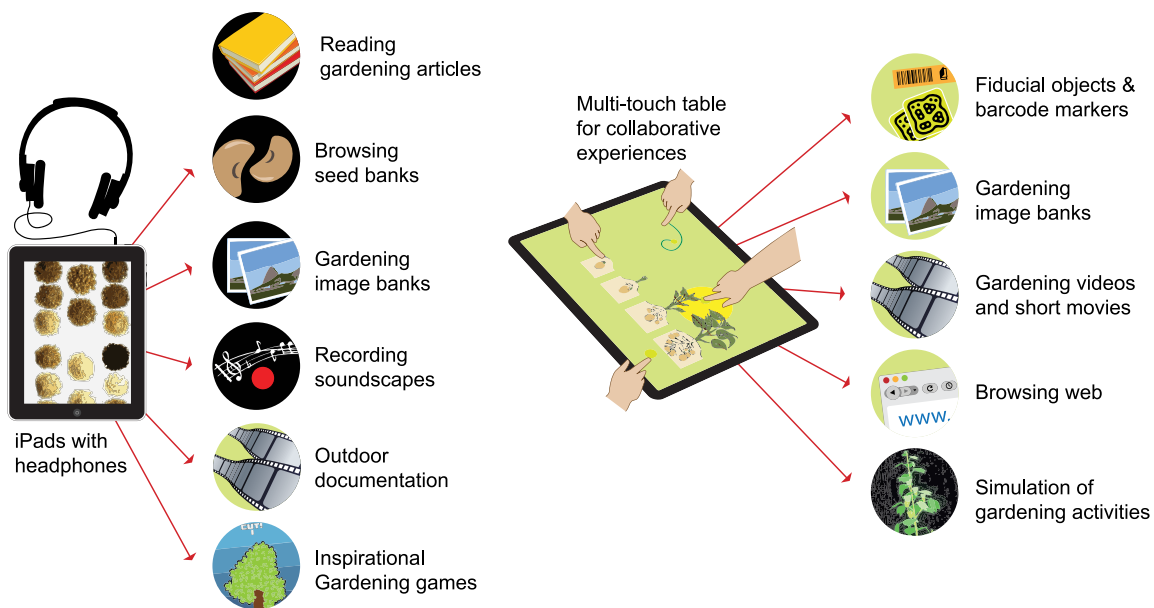
8.3.5 GARDENING

This theme is season specific as in Finland, it can happen only during the summer time. The library bus will carry equipment that will allow children to engage with gardening activities. The bus can either rent out equipment or host events around gardening activities. The idea is to teach children, and other visitors, about gardening, plants and insects through collaboration with gardeners and enthusiasts willing to share knowledge. Media tools inside the bus will enhance the gardening experience by allowing for quick browsing of gardening information. Applications on the iPad can allow children to engage in documenting and collecting information about their plants. The display screen can showcase related information or documentaries for inspiration. Books and other thematic materials would also contribute to the theme.

Objects tagged with fiducial markers could allow children to browse everything from flowers and seeds to plant classification, by placing them on the multi-touch table. There could be activities centered around various plant-based topics – from growth and maintenance, to structure and nourishment. A vast topic, this theme could also be taken advantage of – for cross-cultural studies where the children would be exposed to utilitarian plants from other geographies and histories. Of course, growing one's own plants and experiments centered around that activity would be of primary prominence.

The activity can be situated within school premises and can even be scheduled after school hours for other visitors. It would be a fun summer vacation activity as schools are likely to be closed for holidays. Learning, enjoying and sharing is the main purpose of all the activities proposed here; and none more so than this where people share the sun and grow fruits, flowers and vegetables together. Food grown as part of this theme could lead to a cookout with the participants. The enthusiasm and joy from the workshops should be shared in order to sustain a continuous flow of participants. This will ensure a collective ownership of the service over time.

.....



Media tools & Interactions for Gardening



Gardening - Scenario 1



Gardening - Scenario 2

9

Välkky

Välkky, the name of the new bus, means 'a bright spark' in Finnish — the name suggests the bright and exciting time awaiting the children in the bus. The name was selected through a name competition among the children in Espoo. The winner was declared on the inauguration and he received a prize of a private Mini Cinema event in the bus. The library also organised a song and dance show by children on the inauguration day. It was indeed a proud moment for all the team members who had put in so much effort to make this happen. The interior of the bus was built and manufactured by the Kiitokori Group in collaboration with the spatial design team.

The bus was launched on 1 February 2013 at the Sello Library in Leppavara, Espoo. The 'bright spark' received a lot of attention from the media and press as it is a brand new and revolutionary concept — the first of its kind. The bus began its tour of the schools and daycare homes from the beginning of March. Right now, it still is a regular bus carrying books to schools and daycare homes, but soon it will carry the proposed themes. Efforts are underway to make this system a reality.



Välkky - New Library Bus



Välkky - New Library Bus



Välkky - New Library Bus



Inauguration of the New Library Bus



Children entering the New Library Bus

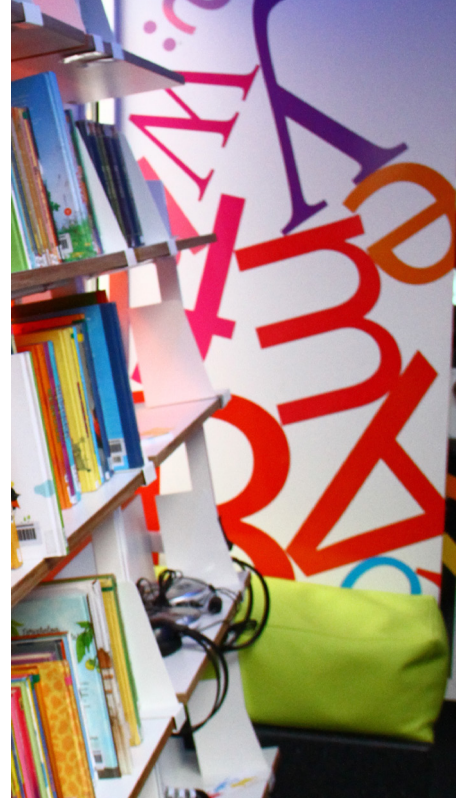
The interior of the bus was carefully designed keeping in mind aspects such as modularity of furniture, spaces for activities, storage and power-supply for media tools, books and also some fixed areas in the bus. The bus was designed to allow sufficient natural light to seep inside. The interiors are cozy, colorful and comfortable, making the bus a cheerful space for the children.

A few details of the interior of the bus:

- **Smart-glass window at the rear-end of the bus** — to let the outside light come in when there are no projections to be displayed on the screen. It can switch between transparent and opaque at flick of a switch.
- **Cozy music corner** — with room for one person to sit and listen to music. The music corner provides for a bit of private space where one can sit and listen to music inside the bus. In time, this area would be provided with iPods and headphones.
- **Modular shelves** — designed in a way that books or iPads can be easily removed. The shelves can be moved easily to change the theme or ambience.
- **Flexible table for librarians** — with sufficient space to sit and move around, designed by the spatial designers. The height of the table can be changed by the librarians. This was designed keeping in mind the height of younger children borrowing or returning the books. The table has drawers for storage.
- **Ambient LED lights** — running along the sides of the bus to set the right mood inside the bus depending on the theme. The lights can be changed and controlled.
- **Self-issuing system** — a new system was implemented for the new bus, instead of having a computer that occupied a lot of space and went unnoticed by everyone.
- **Transparent top of the bus** — to let outside light come in. When the bus needs to be dark, blinds are provided to cover the top.
- **Promethean multi-touch table** — integrated into a bus for the first time. Allows many children to work, explore and create simultaneously.



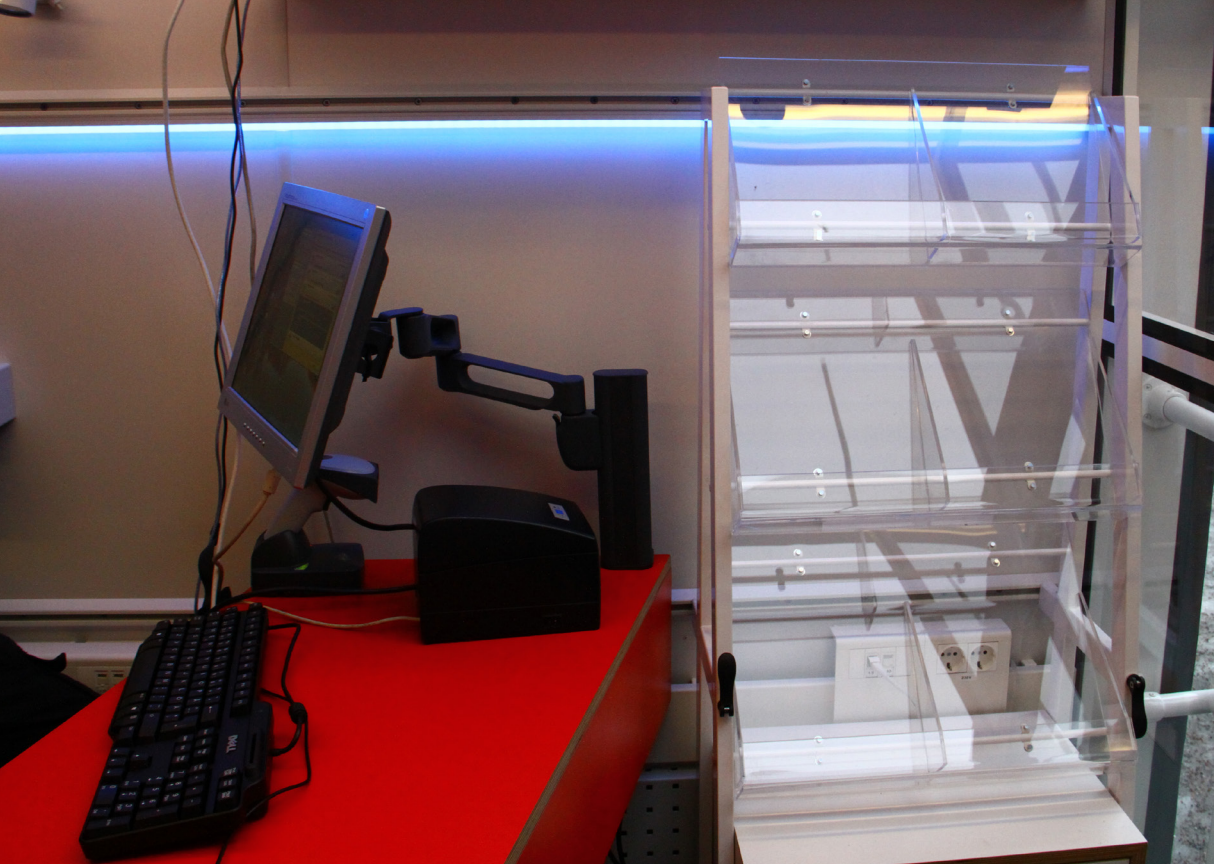
Projector & Smart screen at the rear end



Cozy corner for music listener



Modular book shelves



Librarians desk & shelf for iPad's



LED strip lighting to change the ambience



Self-borrowing machine



Transparent top with blinds



Child interacting with the Multi-touch table



Bibliography

Bertran, I., 2011. Pas a Pas: a platform for enabling schools to teach educational content using stop motion animation, in: Proceedings of the 10th International Conference on Interaction Design and Children. pp. 231-233.

Beyer, H., Holtzblatt, K., 1999. Contextual design. interactions 6, 32-42.

Blake, S., Winsor, D., Allen, L. (Eds.), 2011. Technology and Young Children. IGI Global.

Blanca Juti Empathy, Creativity & Courage Archives » Blanca Juti , n.d. URL <http://blancajuti.com/blog/category/empathy-creativity-and-courage/> .

Brodersen, C., Iversen, O.S., 2005. eCell: spatial IT design for group collaboration in school environments, in: Proceedings of the 2005 International ACM SIGGROUP Conference on Supporting Group Work. pp. 227-235.

Detken, K., Martinez, C., Schrader, A., 2009. The search wall: tangible information searching for children in public libraries, in: Proceedings of the 3rd International Conference on Tangible and Embedded Interaction. pp. 289-296.

Dilley, P., 2004. Interviews and the philosophy of qualitative research. The Journal of Higher Education 75, 127-132.

Druin, A., 2008. LIFELONG INTERACTIONS Designing online interactions. interactions 15, 42.

Druin1234, A., Weeks12, A., Massey12, S., Benjamin, B., 2007a. Children's interests and concerns when using the international children's digital library: a four-country case study, in: Proceedings of the 7th ACM/IEEE Joint Conference on Digital

Libraries: Vancouver, British Columbia, Canada, June 18-23, 2007: Building & Sustaining the Digital Environment: JCDL 2007. p. 167.

Druin1234, A., Weeks12, A., Massey12, S., Benjamin, B., 2007b. Children's interests and concerns when using the international children's digital library: a four-country case study, in: Proceedings of the 7th ACM/IEEE Joint Conference on Digital Libraries: Vancouver, British Columbia, Canada, June 18-23, 2007: Building & Sustaining the Digital Environment: JCDL 2007. p. 167.

Duncan, A.S., Beabes, M.A., 1995. Contextual inquiry: grounding your design in user's work, in: Conference Companion on Human Factors in Computing Systems. pp. 359-360.

Eriksson, E., Lykke-Olesen, A., 2007. StorySurfer: a playful book browsing installation for children's libraries, in: Proceedings of the 6th International Conference on Interaction Design and Children. pp. 57-64.

Giaccardi, E., Paredes, P., Díaz, P., Alvarado, D., 2012a. Embodied narratives: a performative co-design technique, in: Proceedings of the Designing Interactive Systems Conference. pp. 1-10.

Giaccardi, E., Paredes, P., Díaz, P., Alvarado, D., 2012b. Embodied narratives: a performative co-design technique, in: Proceedings of the Designing Interactive Systems Conference. pp. 1-10.

Guha, M.L., Druin, A., Fails, J.A., 2010. Investigating the impact of design processes on children, in: Proceedings of the 9th International Conference on Interaction Design and Children. pp. 198-201.

Hansen, N.B., Dalsgaard, P., 2012. The Productive Role of Material Design Artefacts in Participatory Design Events. pp. 665.

Hapel, R., 2010. Urban Mediaspace Aarhus. BIBLIOTHEK Forschung und Praxis 34.

Kupiainen, R., Sintonen, S., Suoranta, J., 2008. Decades of Finnish media education. Publications of the Finnish Association on Media Education, Tampere.

Leinonen, T., Toikkanen, T., Silfvast, K., 2008. Software as hypothesis: research-based design methodology, in: Proceedings of the Tenth Anniversary Conference on Participatory Design 2008. pp. 61-70.

.....

Lim, Y.-K., Stolterman, E., Tenenberg, J., 2008. The anatomy of prototypes. *ACM Transactions on Computer-Human Interaction* 15, 1-27.

Lykke-Olesen, A., Nielsen, J., 2007a. bibPhone: adding sound to the children's library, in: *Proceedings of the 6th International Conference on Interaction Design and Children*. pp. 145-148.

Lykke-Olesen, A., Nielsen, J., 2007b. bibPhone: adding sound to the children's library, in: *Proceedings of the 6th International Conference on Interaction Design and Children*. pp. 145-148.

McLuhan, Marshall, 1994. *Understanding media: The extensions of man*. MIT press.

Medler, B., Magerko, B., 2010. The implications of improvisational acting and role-playing on design methodologies, in: *Proceedings of the 28th International Conference on Human Factors in Computing Systems*. pp. 483-492.

Muller, M.J., Kuhn, S., 1993. Participatory design. *Communications of the ACM* 36, 24-28.

Multiculturalism Policies in Contemporary Democracies - Finland , n.d. URL <http://www.queensu.ca/mcp/immigrant/evidence/Finland.html> .

Papert, S., 1980. *Mindstorms Children, computers, and powerful idea*. Basic Books, Inc.

Resnick, M., 2007. All I really need to know (about creative thinking) I learned (by studying how children learn) in kindergarten, in: *Proceedings of the 6th ACM SIGCHI Conference on Creativity & Cognition*. pp. 1-6.

Santanen, E.L., Briggs, R.O., Vreede, G.-J.D., 2004. Causal relationships in creative problem solving: Comparing facilitation interventions for ideation. *Journal of Management Information Systems* 20, 167-198.

Snibbe, S.S., Raffle, H.S., 2009. Social immersive media: pursuing best practices for multi-user interactive camera/projector exhibits, in: *Proceedings of the 27th International Conference on Human Factors in Computing Systems*. pp. 1447-1456.

Strommen, E.F., Lincoln, B., 1992a. Constructivism, technology, and the future of classroom learning. *Education and Urban Society* 24, 466-476.

.....

Weidenhaupt, K., Pohl, K., Jarke, M., Haumer, P., 1998. Scenarios in system development: Current practice. *Software*, IEEE 15, 34-45.

Williams, A., 2002. Assessing prototypes' role in design, in: ACM Special Interest Group for Design of Communication: Proceedings of the 20 Th Annual International Conference on Computer Documentation. pp. 248-257.

Bookmobile - Wikipedia, the free encyclopedia
URL <http://en.wikipedia.org/wiki/Bookmobile> .

Education in Finland - Wikipedia, the free encyclopedia
URL http://en.wikipedia.org/wiki/Education_in_Finland .

"El Biblioburro" (Donkey Library) and Other Mobile Libraries | Sustainable Cities Collective
URL <http://sustainablecitiescollective.com/petersigrist/7664/el-biblioburro-donkey-library-and-other-mobile-libraries> .

Finland's Education System Best In World - Business Insider
URL <http://www.businessinsider.com/finlands-education-system-best-in-world-2012-11> .

Finnish Libraries Now!
URL <http://now.libraries.fi/chronology.html#.UUiC9dEmnFw> .

HelMet-kirjasto - Wikipedia
URL <http://fi.wikipedia.org/wiki/HelMet-kirjasto> .

Kirjasto - Wikipedia
URL http://fi.wikipedia.org/wiki/Kirjasto#cite_note-new-2 .

Kirjastoauto - Wikipedia
URL <http://fi.wikipedia.org/wiki/Kirjastoauto> .

Library bus by Muungano - Dezeen
URL <http://www.dezeen.com/2008/11/01/library-bus-by-muungano/> .

liite_3186.doc
URL http://kirjastoseura.kaapeli.fi/admin/luennot/liite_3186 .

.....

Mediakasvatus

URL <http://en.mediakasvatus.fi/node/5568> .

Mobile Library brings joy of learning to children in China - News - Sanoma Learning
- About us - Sanoma.com

URL <http://www.sanoma.com/about-us/sanoma-learning/news/mobile-library-brings-joy-of-learning-to-children-in-china> .

Mobile Library Festival, Turku 2011 - YouTube

URL <http://www.youtube.com/watch?v=jCY2Y2UX6Wc&feature=youtu.be> .

Reaching out through a mobile library - 66th IFLA Council and General Conference
- Conference Programme and Proceedings

URL <http://archive.ifla.org/IV/ifla66/papers/099-175e.htm> .

The Children's Interactive Library - YouTube

URL <http://www.youtube.com/watch?v=Fu7XciJi6xY&feature=youtu.be> .

.....



Appendix

A.1 WORKSHOP PLANS

Plans for participatory design workshops. These plans were designed keeping in mind initial ideas for media interactions in the bus, and the cognitive levels of the children.

A.1.1 JÄRVITORPPA PÄIVÄKOTI

The storytelling would feature a book by the name of Petri that is alive. Petri would be played by a teacher, with the aid of an oversized blank book.

Part 1 – Storytelling and favourite books

Ask all the children to be comfortable, close their eyes and imagine that they are in the World of Books, a world where books are alive.

Follow this introduction with questions:

- What do you find in a book?
- What do you do with a book?
- What cannot a book do? Which is their favourite book?

If they do not answer clearly, prompt them with:

- Can it paint pictures?
 - Can it talk to you?
 - Can it play with you?

 - What are your favourite books?
 - Where do you get your books from?
-

Part 2 - Introducing Petri the book

Petri the book can do everything that you want it to do. He can talk, he can play, and he can help you find answers to your questions. However, Petri the book has feelings and so you have to be careful to not hurt him. He will give you things only in exchange of something you give to him.

Trigger their imagination:

- Can you tell us now what do you want petri the book to do for you?
- Can Petri be your friend?

Await and record their responses.

Part 3 - Breaking from tradition

Proceed to tell them that they need to do something for Petri before they can get Petri do anything for them. Get the children to interact with Petri, a book, through non-traditional methods.

Ask them what they think they should give him? Why?

Ask them also if they can find, or make out of paper, some object and give it to Petri. They need to get Petri to talk to them and make him perform actions.

If someone does not come up with an idea then prompt (along these guidelines):

- Do you think Petri can sing for you?
- What could you do to Petri to make it sing?

Finally, when you are friends with him, take Petri for a walk.



Children's drawing on Petri the book



Design prop - Daycare home

A.1.2 MARTINKALLIO KOULU – GRADE 1

Part 1 — Story and imagination

Using as prop, a crafted oversized book that has an iPad embedded in it; give the children a short introduction and get started with a few questions such as:

What do we do with books?

- What are the different kinds of books that they have seen?
- What is their favourite book? Name them. Ask each one of them what they like about that book.
- Where do they go to get books? (Note if they mention the library bus)

After this they were told that they are going to listen to a story and that they are going to do a little play after the story. Do this by putting heads on the desk and closing eyes for a few minutes while the teacher narrates a story.

In a far far land from here, there was a house full of books. There are Big books, fat books, sad books, happy books, tall books and books of all kinds. But out of all the books in the house there was one book, which was kept in a corner. A book that can do everything that you can ask it to do. This book was a special one of it's kind. It had something different. The only problem was that the book wasn't working anymore. Was it broken? Or did it need something? For years, it had been lying in the corner and no one uses it. Do you want to see and make it work? Do you want the book to do things that you ask it do?

Part 2 — Testing and playing apps

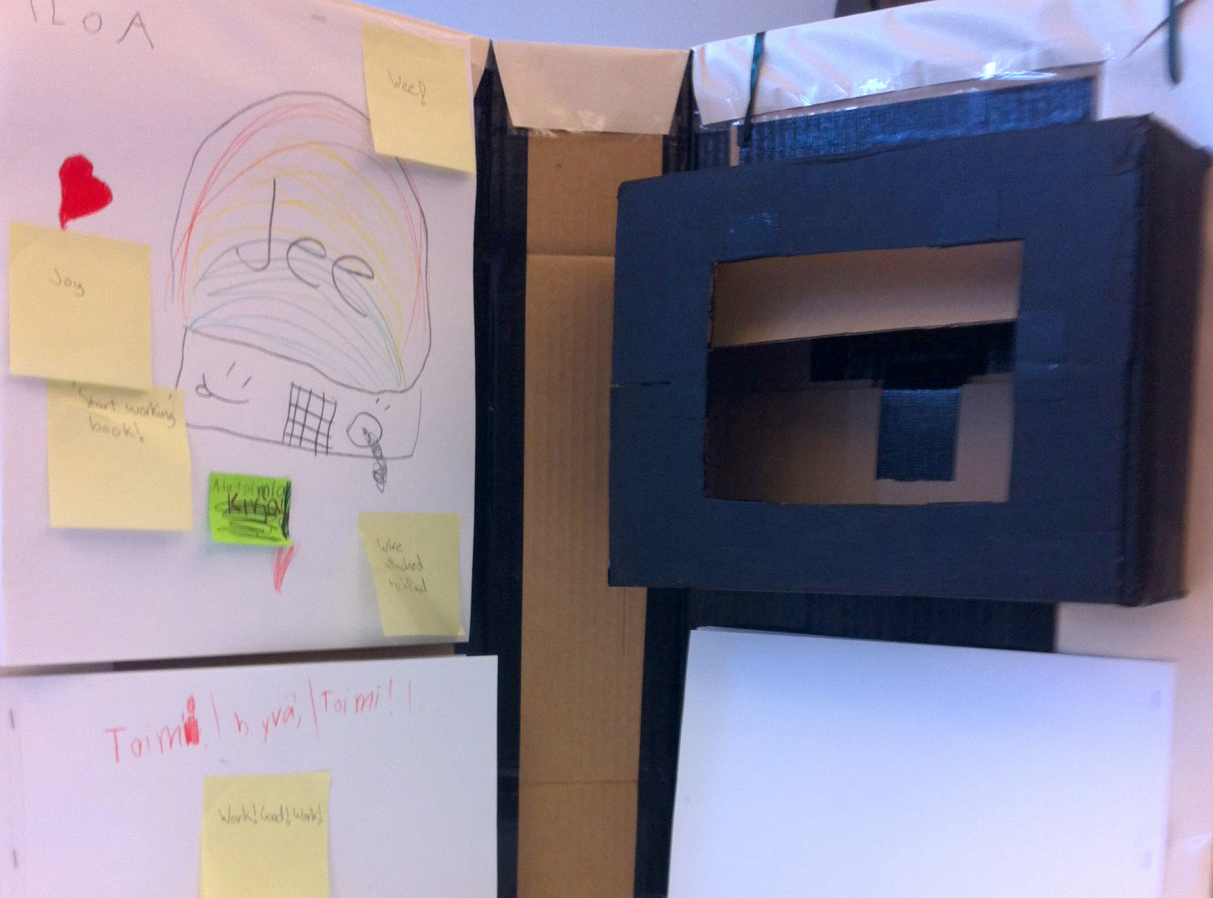
A few apps that I downloaded for user testing.

- The Fantastic Flying Books of Mr. Morris Lessmore
- Singing fingers
- Heart and the bottle
- Timo
- The Boy Giant
- Aiya

Part 3 — Drawing

Ask the children to draw something that they want to see inside the book. The pages of the books are empty. Lets draw and give back to the book.

.....



Design prop - Grade 1



Grade 1 - Child's drawing



Grade 1 child's drawing

A.2 MAKING OF THE NEW BUS

The spatial design team and the team from Kiitokori worked together to manufacture the new bus. It took approximately 5 months to get everything ready. The chassis is by Volvo and the final bus was produced by Kiitokori team to specifications drawn up by me and the spatial design team. The final bus was delivered to the Espoo city library on 13 Nov. 2012. After testing the new media tools and new system, the bus was ready to hit the road and was inaugurated with much fanfare on 1 Feb. 2013.



Making of the bus with Kiitokori team



Making of the bus with Kiitokori team



Making of the bus with Kiitokori team



Making of the bus with Kiitokori team

.....

A.3 MEDIA LIST AND NUMBERS

A list and required number of media tools, correlated with the final themes, were presented to the Espoo city library.

	REGULAR LIBRARY BUS (SHOT TIME)	REGULAR LIBRARY BUS (LONG TIME)	STARRY SKIES	MINI CINEMA (WATCHING MOVIES)
• iPad	10	10	10	
• Headphone	10	15	10	
• iPod touch		10		
• Laptop				
• Multi-touch table		1	1	
• Speaker set	1	1	2	1
• Projector (attached computer)	1	1	1	1
• Smart screen	1	1	1	1
• Other	<ul style="list-style-type: none"> • 1 large board for quick notes and thoughts. • Post-its, markers and other materials to pin up quick thoughts. 	<ul style="list-style-type: none"> • 1 large board for quick notes and thoughts. • Post-its, markers and other materials to pin up quick thoughts. 	<ul style="list-style-type: none"> • max 2, min 1 hide-out tents for children. • Equipment borrowed from the science museums and organisations. 	<ul style="list-style-type: none"> • Drawing & craft material

MINI CINEMA (MAKING MOVIES)	STORYTELLING (LISTENING & TELLING STORIES)	STROYTELLING (MAKING STORIES)	LITTLE GARDENERS
10		10	10
10		10	10
4			
1		1	1
2	1	2	2
1	1	1	1
1	1	1	1
<ul style="list-style-type: none"> ▪ 1 Pas a pas or other stop-motion animation tool (Pas a pas is not yet in production. ▪ Other similar products. 	<ul style="list-style-type: none"> ▪ Costumes and props. ▪ Drawing & craft material. 	<ul style="list-style-type: none"> ▪ Drawing & craft material. 	<ul style="list-style-type: none"> ▪ Other gardening tools.

A.4 MULTI-TOUCH TABLE RECOMMENDATIONS

It was challenging to select the right kind of multi-touch table to be incorporated into the bus. After intensive research, a list of recommendations were made to the Espoo library so that they could make the right decision depending on budget, availability and service in Finland. The Espoo library finally chose the Promethean interactive table which will be seen in Väkky.

PQ LABS MULTI-TOUCH FRAME

How does it work?

The company provides a frame that can be attached to any TV or flat screen. It supports 32 touch points and works very smoothly. This product has been tested in the Media Lab at Aalto University.

Software supported:

PQ labs comes with something called iStick, a customised computer that can be attached to the PQ labs multi-touch frame based on the Android platform. It allows one to download apps from the Android store. One can download more than 600,000 apps from the Android store but one needs to find the interactive apps that suits the purpose/themes. No need for an external Mac Mini. The iStick works as a computer in this case.

Recommended or not:

If Android is the way to go then this is a very good solution.

PROMETHEAN INTERACTIVE TABLE

How does it work?

This is a ready to use multi-touch table solution. Schools use this for interactive activities. Need to visit the distributors in Finland and ask for a demo of this product.

Software supported:

Based on Windows operating systems. Need to ask about the software and the durability of the product.

Recommended or not:

Recommend this product if it has good interactive apps for children.

SMART TABLE

This is a ready to use multi-touch table solution. Schools use this for interactive activities. Need to visit the distributors in Finland and ask for a demo of this product.

Software supported:

Based on Windows operating systems.

Recommended or not:

Recommend this product if it has good interactive apps for children.

OMNITAPPS

How does it work?

Omnitapps are templates provided for multi-touch activities. It is tested on the PQ labs multi-touch frame in Media Lab in Aalto. It works fine but can hang at times if loaded with a lot of images/content.

Software supported:

No need to order. A code will be sent by Omnitapp team via email from where one can download the templates and make changes.

Recommended or not:

Not recommended.

BLUESTACK

How does it work?

It's an application that connects any Windows machine to respond to PQ Labs framework. It allows one to download apps from Android store. Tested in the Media Lab at Aalto University. Interface has problems but the applications run smoothly.

Software supported:

Need to just download the link from their website.

Recommended or not:

Not recommended.

.....

MULTITOUCH.FI

How does it work?

A complete multi-touch package. The product is extremely well designed and works smoothly. Visited and saw the demo in the Visualisation fair in Helsinki.

Software supported:

Needs a developer and a designer to design custom apps. Few ready to use apps available. The company does provide developers and designers who can help make custom apps, for clients, on demand.

Recommended or not:

Highly recommended, provided there is a developer/programmer along with a designer who could make apps to be used on this device

PADZILLA

How does it work?

Only multitouch solution that can work with a customised and hacked iPad. Company provides the iPad and the table. Available in multiple sizes

Software supported:

Needs developer for custom apps. Can use all apps on App Store.

Recommended or not:

Not recommended.

A.5 OTHER GENERAL RECOMMENDATIONS

MULTI-TOUCH TABLE V/S MULTI-TOUCH VERTICAL SCREEN

I recommend a multi-touch table rather than a vertical screen. A table allows for more flexible and collaborative interactions. It accommodates at least 6 children at a time around the table. A vertical screen will allow only for two people interacting simultaneously on a 42" wide screen. This has been tested in the Media Lab at Aalto University. Also it is difficult to interact vertically when using applications that use more than one touch point.

2-3 TOUCH POINTS VERTICAL SCREENS

It will be fine to have one or two 2-3 point vertical screens in the bus. Provided there are specific uses for them. Otherwise, it is not needed. I recommended iPad sized 2-3 touch-point screen for self-issuing screens in our concepts but other than that no other vertical touch screens were mentioned.

IPADS

I strongly recommend iPads to be used inside the bus because it's a device that children of all ages are familiar with and has all the functionalities from single interaction point of view. Even 2 children can use one iPad collaboratively. Tested in the Martikallio workshops. Multiple iPads can be synced at the same time using this — www.note-case.com/NoteSync-173.aspx

IPODS

For listening to music and recording reviews and other general audio usage. For recording reviews of a particular book and retrieving the information from such ipods, a backend system has to be developed in collaboration with a developer and library database.

